APPENDIX F ELECTRICAL REPORT

ABN 50 620 147 319
Ph 0438 451 010
Level 3 Accreditation 4782

DELTA STAR DESIGNS
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Sunnyside Estate Wagga Wagga Subdivision

Objectives:

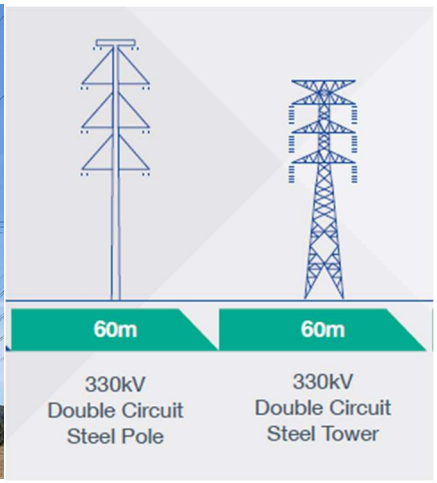
A LEP Variation is to be submitted to WWCC for the rezoning of the land known as 456 and 474 Plumpton Road for proposed residential development. The two blocks comprise approx 110ha, with final lot quantity/size to be determined by obtaining required construction clearances from current electrical assets in the area. The following are the main objectives to be achieved from this report:

1. Minimum setback distance required from electrical assets for residential development including easement widths
2. Electrical capacity currently in the local area to provide power to the proposed estate
3. Allowed construction types within the easements / under the HV overhead cables

1. Minimum setback distance required from electrical assets for residential development including easement widths:

Transmission line easements vary in width depending on the operating voltage and design of the infrastructure. Generally, the higher the voltage, the wider the easement. Figure below shows the typical widths of transmission line easements.

Transgrid transmission Towers on site are 330kV and would have a minimum 60m wide easement as per TransGrid guidelines.



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Transgrid transmissions lines shown in red are 330kV and would have a minimum 60m wide easement as per TransGrid guidelines.

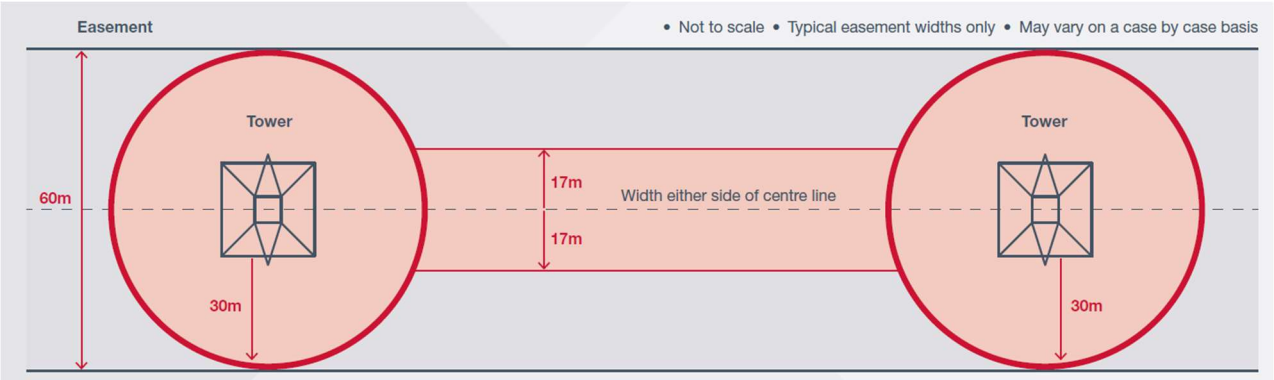

Figure 3: 220kV and above Exclusion Zone

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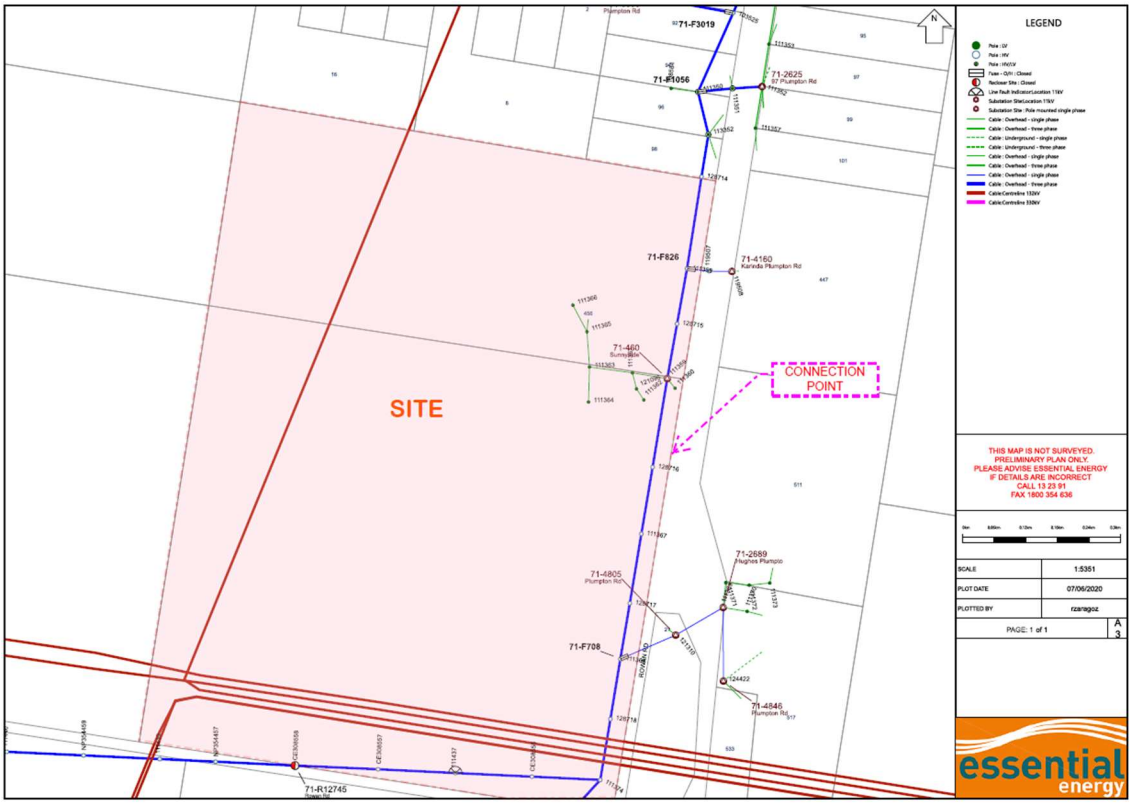
Essential Energy network lines shown in blue and would have a minimum 20m wide easement as per Essential Energy guidelines.



Overhead Powerlines

Construction Type	Width In Metres (Long Spans)	Width In Metres (Short Spans)
132kV		
"H" pole type	45	Case by Case
Single pole	40	
66kV		
'H' pole type	30	Case by Case
Single pole	30	
33kV (Including 19.1kV SWER)		
"H" pole type	30	30
Single pole	25	20
22kV (Including 12.7kV SWER)		
Bare wire	20	15
CCT	20	15
ABC	15	10
11kV		
Bare wire	20	15
CCT	20	15
ABC	15	10
Low voltage		
Bare wire	15	10
ABC	10	5

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2. Electrical capacity currently in the local area to provide power to the proposed estate:

A maximum of 1000kVA load can connect with minimal augmentation required in the external network, i.e. only internal reticulation to supply that stage.
Essential Energy has listed the After Diversity Maximum Demand (ADMD) as:

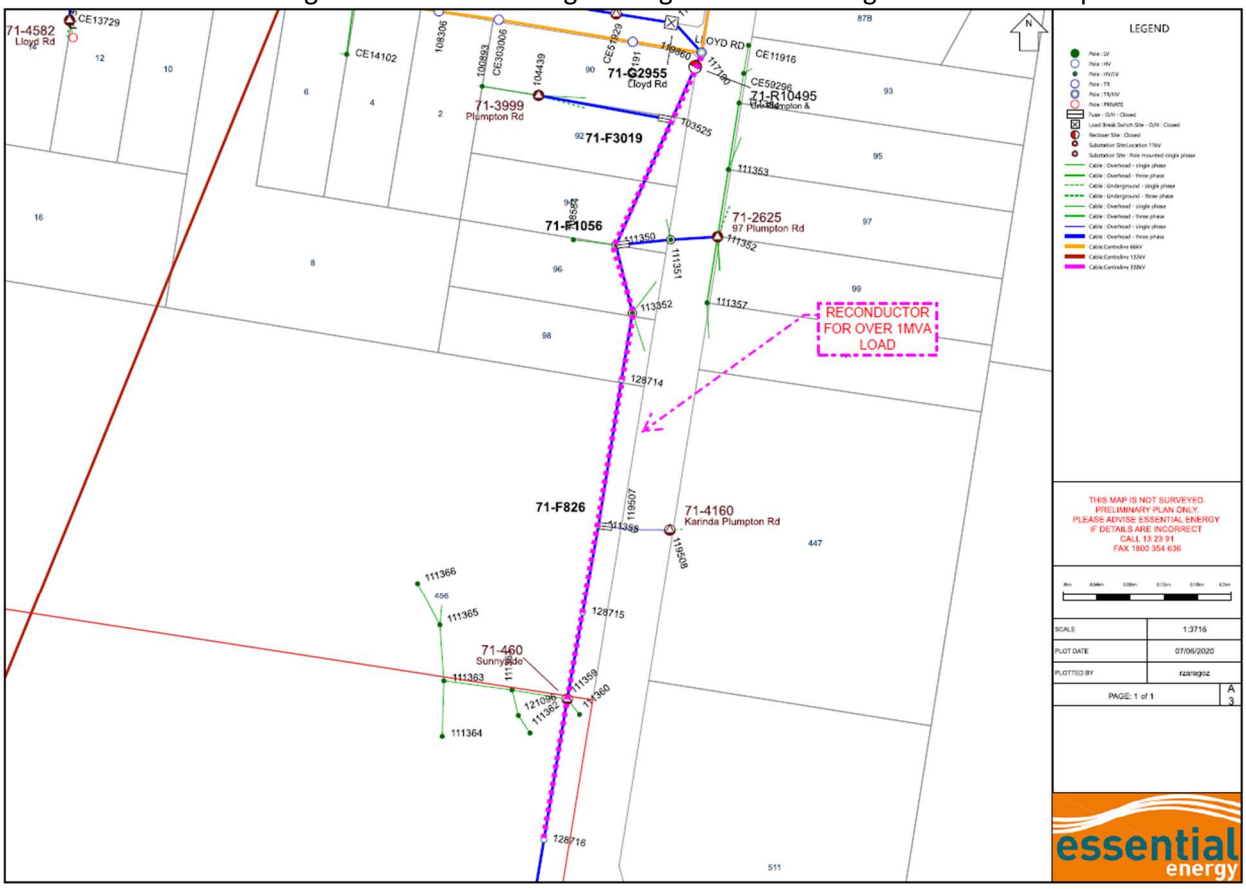
- For Lots with reticulated gas - 4kva per lot
- For Lots without reticulated gas - 6kva per lot

ADMD:
Essential Energy have listed the preferred substation size as being 315kva. Therefore:

- For Lots with reticulated gas - 4kva per lot, a maximum of 78 connections per substation are available so therefore a maximum of 234 lots can be supplied from 3 x 315kVA substations.
- For Lots without reticulated gas - 6kva per lot, a maximum of 52 connections per substation are available so therefore a maximum of 156 lots can be supplied from 3 x 315kVA substations.

Note: The above mentioned lots will be subject voltage drop restraints on cable length calculations.

Essential Energy: Loads above 1000kVA will require the reconductoring of 1km of existing overhead lines with 19/3.75 AAAC to maintain voltage levels for urban. High voltage reconductoring will be between poles 117190 128716.



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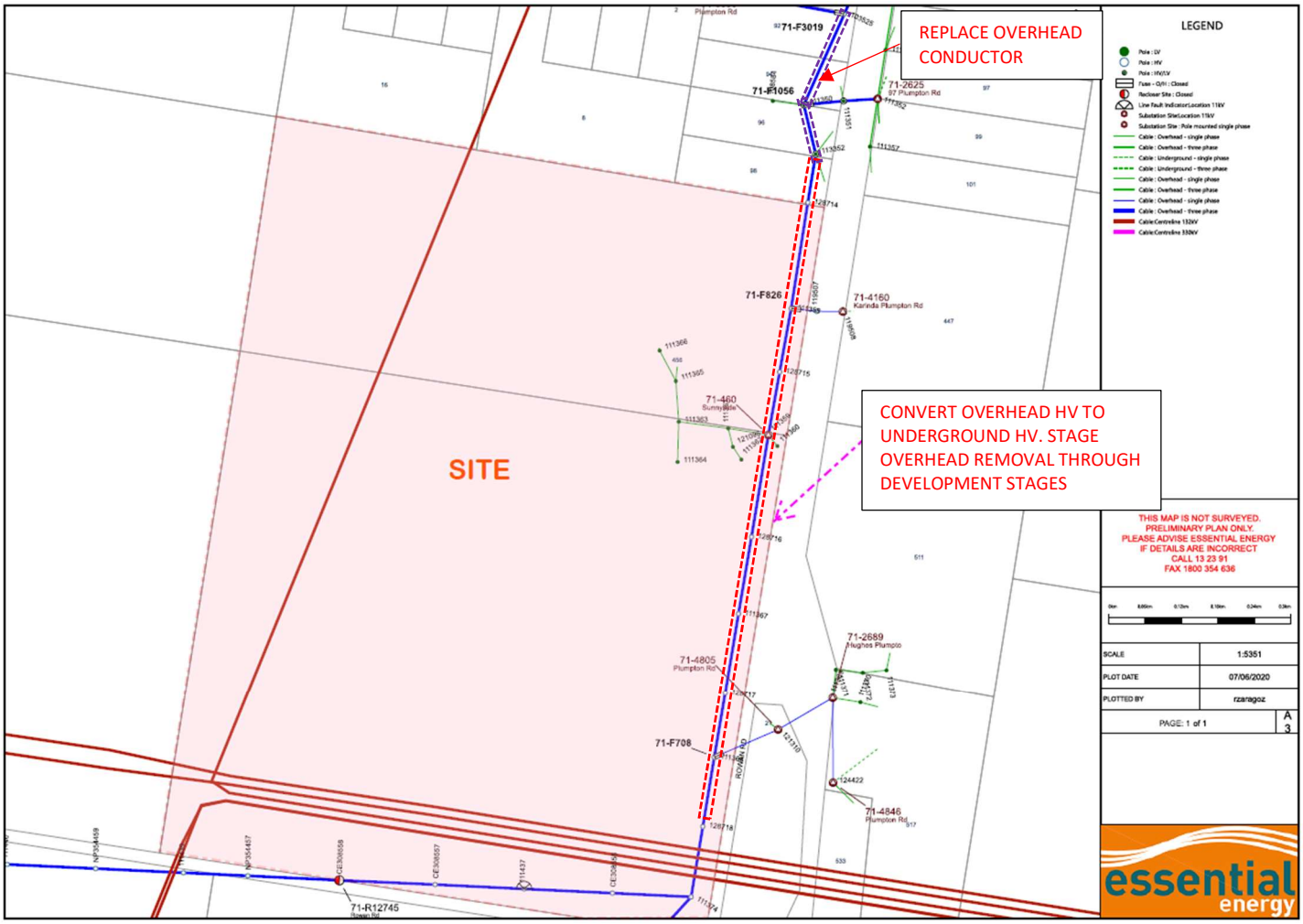
Possible alternative with approval from Essential Energy

- Reconductor short span HV overhead conductor, then replace span that runs length of subdivision with underground HV cable. This could be replaced in stages of the develoement and would allow more land area for development from reduced easement requirements



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3. Allowed construction types within the easements / under the HV overhead cables:

Summary of items relevant to subdivision - Transgrid Easement Guidelines for Third Party Development (V10)

The following activities may possibly be approved with conditions. TransGrid's prior written consent is required. The proponent will have to demonstrate (using the Impact Assessment process) that the risks associated with the activity have been satisfactorily mitigated.

- The erection of flagpoles, weather vanes, single post signs, outdoor lighting, subject to a 4.3 metre height restriction and metallic parts being earthed.
- The erection of metallic fencing less than 2.5 metres in height providing that it is earthed, located more than 20 metres from any part of a transmission line structure or supporting guy and greater than 4 metres of the vertical projection of the overhead conductors.
- The installation of low voltage electricity, telephone, communication, water, sewerage, gas, whether overhead, underground or on the surface.

Note: Services that do not maintain standard clearances to the overhead conductors that are within 15 metres from the easement centre-line, 20 metres from any part of a transmission line supporting structure or are metallic and within 30 metres of any part of a structure will not be approved. TransGrid may impose additional conditions or restrictions on proposed development.

- The installation of high voltage electricity services, subject to there being no practicable alternative and provided the standard clearances are maintained to the supporting structures.

Note: Where extensive parallels are involved certain additional safety requirements may be imposed by TransGrid, depending on the particular case and engineering advice.

- Swimming pools, subject to TransGrid's strict compliance criteria.

Note: Above ground pools will not be approved. In-ground pools will not be approved if there is a practicable alternative site clear of the easement area. If there is no practical alternative site, in-ground pools including coping will not be approved if it encroaches more than 4.5 metres, or is less than 30 metres away from a transmission line structure. A site specific assessment by TransGrid is required.

- Detached garages, detached carports, detached sheds, detached stables, detached glass houses, caravans, site containers, portable tool sheds, pergolas and unroofed verandahs attached to residences on the outer 3 meters of the easement only.
- Prefabricated metal (garden) sheds. TransGrid approved sheds must be earthed.

Note: Sheds exceeding 2.5 metres in height, with a floor area exceeding 8m², encroaching more than of up to 3 metres or within 30 metres of any part of a transmission line structure will not be approved. Connection of electric power will not be approved.

- Single tennis courts.

Note: Tennis courts that hinder access are for commercial use or do not provide adequate clearances shall not be approved.

- Subdivisions. See Appendix C requirements page 7 below
- Roads, carparks, cycleways, walking tracks and footpaths on the outer part of the easement or as a thoroughfare across the easement, subject to horizontal and vertical clearances. Restrictions and other conditions on consent may also apply. These will not be approved when located within:
  - 20 metres of any part of a transmission line structure
  - 17 metres of the centre-line of a transmission line above 132kV

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Note: Roads and pathways that cross the transmission line as a thoroughfare may be permitted. Where it is proposed that a road passes within 30 metres of a transmission structure or supporting guy, TransGrid may refuse consent or impose restrictions and other conditions on consent. Where a road passes within 30 metres of a transmission structure or supporting guy, the structure's earthing system may require modification for reasons including, but not limited to, preventing fault currents from entering utility services which may be buried in the road. The option of raising conductors or relocation of structures, at the full cost to the proponent, may be considered.

- Excavation – subject to restriction criteria.

Note: Substantial excavations located within 20 metres of any part of a steel tower or pole structure and exceeding a depth 3 metres will not be approved.
Note 1: An encroachment or activity that is located outside the prohibited distance of the infrastructure but still within the easement will not necessarily be permitted. It will generally need to be addressed in the Impact Assessment and remains subject to TransGrid prior consent.
Note 2: The above list is not exhaustive and if there is any uncertainty as to whether an activity or encroachment is acceptable within an easement, please contact TransGrid. TransGrid may impose additional conditions or restrictions on proposed development.

Appendix C - General Requirements for Developments and Subdivisions
The following list of current general requirements is provided for your information. It should be noted that the list is not exhaustive and, where there is any doubt concerning a particular activity within the easement area advice should be sought from TransGrid.

1. Completed Works
The completed works shall provide for the following considerations:
> A safe unobstructed working platform shall be preserved around the transmission line structures for access by EWP, cranes as well as other large plant and equipment. No obstructions of any type shall be placed within 30 metres of any part of a transmission line structure.
> Roads, streets etc (including kerb to property boundaries) and intersections shall not be located within 30 metres of any TL structure.
> Developments must meet the clearances requirements set out in AS7000 between their finished level and the conductor at its maximum operating temperature.
> Proposed roadway locations shall also take into consideration any street lighting requirements to ensure that statutory clearance requirements are followed. The design clearances should include future maintenance safety issues. TL outages will not be provided for street light maintenance. Access to the TL and its structures shall be available at all times for TransGrid plant and personnel. In this regard a continuous and unobstructed access way shall be retained along the easement.
> Where fences are required for security purposes access gates will be installed in an agreed location and a TransGrid lock will be fitted.
> Application of "prudent avoidance" in relation to electric and magnetic fields should always be observed.
> No increase in earth potential rise risks.
> All underground services installed more than 20 metres but within 30 metres of a TL structure shall be non-metallic. Utility services (including street lighting), whether above or below ground, shall not be installed without prior written approval of TransGrid.

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> Excavation work or other alterations to existing ground levels shall not be carried out within the easement area without the prior approval of TransGrid. Approval will not normally be granted for such work within 20 metres of any supporting structure.
> Boundaries for new subdivided properties should not be located within the easement.
> Fenced boundaries for all new properties in the subdivision shall not be within 30 metres of any TL structure.
> A "Restriction-as-User" (88B Instrument) shall be placed on the titles of any created lots that may become affected by a TL easement. Any proposed activity within an easement area will require the prior written approval of TransGrid (appropriate wording will be advised when required).
> Any proposed development must not impact on TransGrid's costs of inspecting, maintaining or reconstruction of the transmission lines.
> In order to comply with its statutory responsibilities to maintain adequate clearance between the conductors and any forms of vegetation, TransGrid maintains its easements as follows:
− Tall growing species likely to infringe safe clearances are to be removed regardless of existing height at time of construction.
− Trees likely to fall onto conductors or towers are also to be removed whether on the easement or off the easement (ref. Sec 48 of the Electricity Supply Act 1995).
− Shrubs and other vegetation of lower mature height within the easement will be reduced and managed, generally by slashing with ground level retained.
− Vegetation management will aim to reduce available fuel and subsequent bushfire risks in accordance with NSW Rural Fire Service Bush Fire Environmental Assessment Code that sets out the requirements for hazard reduction strategies such as Asset Protection Zones and Strategic Fire Advantage Zones.
− Removed vegetation will be mulched or chipped and removed from site or retained on site in accordance with owner/stakeholder requirements.
− Other works considered necessary in order to provide a safe working environment for maintenance staff, contractors and for the property owner/manager will be undertaken.
Proposed vegetation plantings, such as Riparian corridors, within the transmission line easements shall be compatible with the above maintenance requirements and must consider on-going vegetation control.

2. Construction
During construction, the development plans shall also provide for the following considerations:
> Vehicles, plant or equipment having a height exceeding 4.3 metres when fully extended shall not be brought onto or used within the easement area without prior TransGrid approval.
> Where temporary vehicular access or parking (during the construction period) is within 16 metres of a transmission line structure, adequate precautions shall be taken to protect the structure from accidental damage. Plans need to be submitted to TransGrid for prior approval.
> The easement area shall not be used for temporary storage of construction spoil, topsoil, gravel or any other construction materials.

3. Costs
The Developer shall bear all costs of any specialist design studies, TransGrid supervision, reconstruction or modification of the transmission line and its components, including consultation and design required to maintain clearances due to proposed ground level changes; road crossings within the easement; or due to any damage to the TL arising from the development.

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Essential Energy Easement Requirements

The landowner agrees that it will not:

- Place or permit to be placed any services or structure within the easement site,
- Alter the surface of the easement site,
- Do or permit to be done anything that restricts access to the easement site by Essential Energy, or
- Plant or allow to grow vegetation other than low or horizontal growing grasses within the easement site without the written permission of Essential Energy and in accordance with such conditions as Essential Energy may reasonably impose.

DESIGN INFORMATION PACKAGE
FOR Project: 121540 Subdivision - 456 Plumpton Road Wagga Wagga - John Randell Consulting Pty Ltd

Design Information Issue Date: 7/06/2020.

Delta Star Designs Pty Ltd
PO Box 1274
WAGGA WAGGA NSW 2650

Introduction

Thank you for your application requesting electrical reticulation design information for the proposed supply to **Lot 23 & 25, DP 757246**

Project Address: 456 Plumpton Road Wagga Wagga NSW 2650

Customer Name: John Randell Consulting Pty Ltd

General

1. The project number **121540** has been established and shall be used for all future reference and payment transactions.

2. The content of this Design Information Package has been compiled on the basis of certain conditions and restrictions. The designer shall incorporate these requirements within the electrical reticulation design prepared for presentation to Essential Energy.

3. The Design Information Package will be valid for a period of 180 days from the above date. If an updated package is required, please send an email request to contestableworks@essentialenergy.com.au and quote the project number.

4. Essential Energy is providing this information in good faith, to assist you to complete designs for certification. Essential Energy cannot and does not warrant the accuracy or completeness of the information and does not accept any liability for inaccuracies or lack of information. It is the responsibility of the applicant or Accredited Service Provider to independently confirm the accuracy or otherwise, of any information.

Connection Point & Specific Design Information

The regulatory category for the project is: **UG Urban Residential Subdivisions**

The nominated connection point on the network will be at Asset No: **128716.**

Connection Point Voltage: **11,000 Volts 3Ø**

Connection Contract

A Development Application/Determination has not been submitted. This Design Information Package is based on the information supplied with the request.

A Development Application/Determination must be in place into prior to submitting a design package for certification. If the information supplied with the Development Application/Determination does not match the information supplied with the request for design information, Essential Energy may require the Design Information Package to be reissued and additional charges may apply.

Existing Asset Details

The existing High Voltage Conductor is: **6/4.75+7/1.660 ACSR**

New Asset Details:

The Minimum size for the New HV conductor / cable required: **19/3.75 AAAC | 240mm 3C AL XLPE**
The Minimum size for the New LV conductor / cable required: **LV 240mm 4 Core AL XLPE**

To request Asset Numbers please email Contestable Works stating the number and type required.

Project Specific Comments:

Your application to provide electrical supply to Sunnyside Estate 500-lot subdivision has been approved.

The proposed 500 lot subdivision is with no gas reticulation. The load will be closer to 3000kVA using 6kva/lot ADMD (500x6kVA/Lot = 3000kVA) and not 2000kVA as proposed.

Given limited information provided and assuming this development will be released in stages the following network augmentation will be required:

- The first stage or equivalent of 1000kVA can connect with minimal augmentation required in the external network, i.e. only internal reticulation to supply that stage.

- For the load above 1000kVA will require the recoductoring of 1km of existing overhead lines with 19/3.75 AAAC to maintain voltage levels for urban. High voltage reconductoring will be between poles 117190 128716.

ADMD is 6kVA/lot (Residential with no gas reticulation) shall be used for voltage drop analysis.

Street lighting along the proposed public road within the subdivision must be provided by the developer in accordance with Wagga Wagga City Council requirements.

All works are to comply with Essential Energy Overhead/Underground Design & Construction Manual, NSW Service and Installation Rules, AS/NZS 7000 and AS/NZS 3000.

Easements will be required in compliance to CEOP8046.

Zone Substation: KOO Kooringal
Feeder: KOO3B1 Plumpton Rd
Maintenance Area: Wagga - 7131 - Plumpton Road

The nearest Essential Energy Depot is: **Wagga Wagga**

Project Funding Arrangements

Essential Energy's policy CEOP2513.06 Connection Policy – Connection Charges sets out the circumstances in which Essential Energy requires a retail customer or real estate developer to pay the cost of connecting their premises or development to Essential Energy's network.

A copy of CEOP2513.06 can be downloaded from Essential Energy's website: www.essentialenergy.com.au.

In accordance with CEOP2513.06 the following funding arrangements will apply to this project:

Customer funded:

- All works

Pioneer Scheme - Reimbursement

General

AER requires that Essential Energy administer a Pioneer Scheme from 1 July 2014 in accordance with the requirements of the AER Connection Charge Guidelines for Electricity Retail Customers – Under Chapter 5A of the National Electricity Rules, and Essential Energy's Connection Policy as approved by the AER.

Requirements of the Pioneer Scheme are outlined in Essential Energy's document *CEO2513.06 Connection Policy – Connection Charges*.

Project specific

The customer is required to complete and sign a CEOF6283 Pioneer Scheme Application Form regardless of whether a pioneer scheme is being implemented or not. The Level 3 ASP must submit the form with the design package for certification.

Ancillary Network Service (ANS) Charges

Compulsory network fees for this project are calculated in accordance with the Australian Energy Regulator (AER), Charges for Monopoly Services.

Your client is to be advised of any compulsory network fees that are applicable to this project.

Total fees for the Design Information stage of this project are **$785.55**
Note that invoicing sent to you (separately) will detail the breakup of this amount.

Other fees that may be applied to this project are listed in the document titled 'Price Schedule for Ancillary Network Services' that can be found at Essential Energy's website: (http://www.essentialenergy.com.au/content/electricity-network-pricing-and-information).

*** Note - ANS fees exclude GST and are subject to annual price increases in accordance with the National Regulatory Framework. Care should be taken to select the fee appropriate to this project type. Design certification fees will be based on the date of receipt of a complete and correct submission for certification. All other fees will be based on the work completion date. (eg. date of outage, commissioning, inspection).**

GENERAL DESIGN INFORMATION

Project correspondence

All correspondence and submissions for the project should be sent to:

contestableworks@essentialenergy.com.au

To avoid delays, please include the project number **121540** in the email subject line.

Design Standards

Applicable Essential Energy design standards include:

- CEOM7001 – Network Services – Design Construction Drawings,
- CEOM7097 – Overhead Design Manual,
- CEOM7098 – Underground Design Manual
- CECM1000.70 - Environmental Impact Assessment NSW
- CEOM5113.02 - High Voltage A.C. Distribution Earthing

Other applicable standards or regulations include:

- Work Health and Safety Act 2011 (NSW)
- Work Health and Safety Regulation 2011 (NSW)
- Electricity Supply Act 1995 (NSW)
- Environmental Planning and Assessment Act 1979 (NSW)
- AS/NZS 7000:2010 Overhead Line Design
- AS1158 : Road Lighting
- AS 2067: Power installations exceeding 1kV A.C.

- Energy Networks Association EG-0 Power System Earthing Guide.
- Appropriate WorkCover NSW standards, guides and directives.
- Appropriate Environmental Protection Authority of NSW standards, guides and directives.

Network Optimisation

The Level 3 ASP must ensure that the design is carried out in such a way as to optimise future network operating and maintenance costs rather than solely minimising initial connection costs. Consideration should be given to utilising or upgrading existing assets (eg. poles and transformers) where possible.

When assessing connection proposals, Essential Energy will use network optimisation considerations to determine which connection proposals are acceptable.

Subdivision lots

The electrical supply requirements for Urban Residential Subdivision lots, shall be designed and planned to avoid future disruptive augmentation work. Where newly created lots have the potential to be further subdivided, consideration should be given to providing electrical service points at either property boundary in order to facilitate this requirement. It is important that communication with the responsible developer is maintained through the design process to ensure the ongoing electrical requirements for the project are met, where they change Essential Energy should be notified.

As a minimum the designer should include the installation of conduits from a designed LV distribution point to any potential future supply point. This consideration is related to larger prestige or corner lots which would meet the requirements of the local council for a further subdivision of land to occur.

Other Services

The Level 3 ASP must carry out a Dial Before You Dig search and is responsible for ensuring that the design does not impact on other services, e.g. telecommunication, gas, water etc. DYBD information should be clearly shown on the design.

In the event the works or design needs to be varied, amended or rectified due to a conflict with other services, the Level 3 ASP is responsible for any subsequent redesign required.

The Level 3 ASP must also ensure that the design will not conflict with proposed services to be installed in conjunction with the development.

Third Party Attachments

Essential Energy has existing joint use arrangements and operates Facilities Access Agreements (FAA's) within its network that allows third party attachments to use Essential Energy assets, for example - optical fibre or telecommunications equipment. It is the Level 3 ASP's responsibility to identify and verify third party attachments and communicate with the third party as part of the design process. Where third party attachments are within the project scope this should be identified on the construction plan.

The Essential Energy form CEOF6586 – Advice of Pole Maintenance is available on the Essential Energy document library and contains contact information for the level 3 ASP, this form should also be used by the level 1 ASP as part of notification for construction. Connection applicants should be aware that they will be responsible for any fees associated with relocation works required by the attachment owner.

Materials

All materials specified in the design must comply with CEOM7004 – Materials Inventory: Contestability (Approved)

Non-standard materials may only be used with written permission from Essential Energy. Please submit requests to the Contestable Design & Certification department with full details justification and engineering certification where required.

All assets to be removed from the Essential Energy network within this project are to be nominated on the operational form CEOF 2098 and returned to the Essential Energy regional store located at **Wagga FSC**. The stores contact for this project is **Damien Maloney** who can be contacted during office hours on **02 6933 5856**. This requirement should be clearly noted on the project design.

Work Health and Safety

The Work Health and Safety Act 2011 (NSW) and the Work Health and Safety Regulation 2011 (NSW) assign significant responsibilities to designers, constructors and the person who commissions the works.

Regulation 295 of the Work Health and Safety Regulation 2011 requires a designer to provide a designer safety report to the person who commissioned the design. For the purpose of this legislation the connection applicant is the person who commissions the design and Essential Energy is the entity who will take ownership of the assets upon connection to the network.

A copy of the designer safety report must be included with every design or design amendment submitted to Essential Energy for certification.

At a minimum, the Designer Safety Report **must** include:

- a description of the purpose for which the plant or structure was designed;
- the results of any calculations, testing, analysis or examination;
- any conditions necessary to ensure that the plant, or structure is without risks to health and safety when used for a purpose for which it was designed, or when carrying out any activity related to the plant or structure such as construction, maintenance, and demolition.

The Designer Safety Report should be written with an appropriate level of detail to match the size and complexity of the project.

The Level 3 ASP should link or attach the Designer Safety Report to the design construction plans (and other relevant documents) to ensure the safety information contained within the report is considered by future parties who may work on the designed assets (e.g. during construction, maintenance, decommissioning, demolition etc. phases of the asset lifecycle).

Easements

The Level 3 ASP should consider easements requirements during the design route analysis.

The customer is responsible for all costs associated with the easement creation including solicitor fees, surveying costs and compensation payable to affected landowners.

Where easements are to be created outside of land to be subdivided, satisfactory arrangements must be in place prior to submitting a design package for certification. For further information, please refer to CEOP8046 *Network Planning: Easement Requirements*.

Easements over Crown land, Crown roads or waterways must be obtained by Essential Energy through the compulsory acquisition process, in accordance with the procedures set out in the Land Acquisition (Just Terms Compensation) Act 1991 (NSW). Please contact the Contestable Design & Certification team for further advice or go to the Easements area of the Essential Energy website which contains an information sheet for crown land easements.

Approvals

The Level 3 ASP must seek approvals from the local council, all road controlling authorities and any land occupier affected by the proposed electrical works. The Electricity Supply Act 1995 (NSW), State Environmental Planning Policy (Infrastructure) 2007 (NSW) and the Roads Act 1993 (NSW) have specific requirements in this regard.

In accordance with Section 45 of the Electricity Supply Act, notification of the proposed works must be given to the local council. The council is allowed up to 40 days to comment and the ASP required must duly consider all responses received.

In accordance with Regulation 42 of the State Environmental Planning Policy (Infrastructure) 2007, notification of proposed substations, or works on an existing substation, must be given to both the local council and to occupiers of all adjacent land. The council and adjacent land owners are allowed up to 21 days to comment. The Level 3 ASP must duly consider all responses received.

For works in, on or over a classified road, Section 138 of the Roads Act requires the proponent to obtain consent from the appropriate road controlling authority, and either consent, or concurrence from the RMS.

Copies of notices to the local council and occupiers of adjacent land, any comments received or a letter stating that no response was received, and any required consent letters are to be provided to Essential Energy with the certification package.

Copies of notices to the RMS (and other road controlling authorities where applicable) and the written consent received must be provided to Essential Energy with the certification package for any works on classified roads.

Design Certification

Please note the following information regarding design package submissions:

1. In addition to specific requirements outlined in aforementioned clauses, the design package shall be prepared in accordance with the technical design requirements as specified in Essential Energy's Design and Construction standards.

2. All relevant documents shall be submitted with the design for certification. (see Required Documents Schedule)

3. Essential Energy will carry out an initial review of the design package and issue certification of the design drawing to indicate that the package is compliant.

4. If it is found that the design package is not compliant with Essential Energy's technical or drawing standards, or specific design requirements, a rejection notice will be issued outlining the reasons for rejection. Design rechecking charges will be applied.

5. Certification will remain valid for a period of 6 months. If construction of the proposed works has not commenced before this period expires, the design package must be updated and re-submitted for certification prior to submission of the Notice to Commence Construction.

In certifying any design, Essential Energy makes no warranty, express or implied, that the design is:

1. Fit for its intended purpose
2. Suitable for the site conditions
3. Free of design defects (i.e. errors and omissions)

The Level 3 ASP (and Level 1 ASP at commencement of construction) acknowledges that Essential Energy has not inspected the site, and therefore, is unfamiliar with the site conditions.

Design certification is granted exclusively based on the submitted design with respect to the construction standards in force at the time. It has no reference to any underlying assumptions or conditions.

Responsibility for the correctness and suitability of the design remains with the Level 3 ASP after certification. Essential Energy will request the Level 3 ASP to correct any design defects discovered after certification is granted and resubmit the design package for certification. Design rechecking charges will be applied.

Environmental

Environmental Impact Assessment

An environmental impact assessment of the project will be required. The assessment is to be completed in accordance with Essential Energy's Environmental Impact Assessment (EIA) Policy CECM1000.70.

A completed *CEOF1070.01 Environmental Impact Assessment: Screening Worksheet*, and *CEOF1070.02 Review of Environmental Factors Worksheet*, must be submitted with design construction plans and other documents for certification by Essential Energy. An information *sheet CEOH1070.02a REF Worksheet: Information Sheet for use by Accredited Service Providers* is available in Essential Energy's online document library to assist ASPs with the completion of CEOF1070.02.

Please ensure ALL required supporting documentation such as threatened species searches, evidence of community consultation, and notifications to council are included.

Please note, Essential Energy is offering Environmental Impact Assessment training for Level 3 ASPs in early 2017. From 1 July, 2017, this training will be mandatory for any person that completing an EIA for a contestable works project.

Vegetation Management

CEOP2010 Vegetation Clearing Guidelines for New Power Lines outlines the requirements for the clearing of vegetation prior to the installation of new overhead and underground powerlines. The document details responsibilities of Level 3 ASPs in the preparation of their design.

If the project requires the clearing (or trimming) of vegetation, the Level 3 ASP must:

1. Ensure their EIA contains details of the required clearing and approvals for the work.
2. Prepare a Site Specific Vegetation Clearing Management Plan (SSVCMP).
3. Specify the width of the required Clearing Zone taking into account the minimum Clearing Zone dimensions (Section 3.2.5) and other factors such as conductor blowout.
4. Include a reference to the SSVCMP on the design construction plan.
5. Ensure the Level 1 ASP who will construct the project is provided a copy of the SSVCMP.

The SSVCMP plan must address all the issues identified in the Environment Impact Assessment. For example, site remediation to prevent the onset of erosion. A list of the minimum information to be included in SSVCMP is in Section 4 of CEOP2010. Essential Energy's certifying officer will assess the submitted EIA and SSVCMP prior to certifying the design.

Clearing works must not commence until design certification has occurred.

Substation Sites

Substations must comply with the requirements of Essential Energy standard construction drawings and design manuals. Level 3 ASPs are reminded of the following requirements:

General:

- Unimpeded access is to be provided for Essential Energy vehicles and staff to substation sites. All substations shall be placed in a location which allows access for a crane borer/erector.
- All padmount substations that are to be installed above the 1:100 year flood level for the local area. Evidence that this requirement is satisfied is to be obtained from the local council, and made available to Essential Energy.
- If an existing substation structure is being altered for any reason, then the structure is to be brought up to the current Essential Energy standards.

Earthing:

- All earthing shall comply with the Essential Energy's policy CEOM5113.02 High Voltage A.C. Distribution Earthing Procedure.
- All earthing designs shall be based on Essential Energy's distribution earthing design software package (Neutron). A copy of the Neutron software package is available on request through neutron@essentialenergy.com.au.
- Level 3 ASPs are required to print an Earthing Report from Neutron and submit it with the design construction drawings for certification.
- Full details of the earthing design must be included on the design drawing.
- Should the customer be upgrading an existing substation, then the suitability of the existing earthing should be assessed for compliance with the current standards. If the existing earthing does not comply, it must be upgraded accordingly.

Voltage Drop Calculations

Where the design requires and alteration to the load on a Low Voltage circuit the Voltage Drop shall be determined using 'LVDROP' software (Version 5.48 or later). CEOM7097 and CEOM7098 provide detailed information on LVDROP's parameter settings, appropriate load allowances for different development types, and the maximum allowable voltage drop in an LV circuit.

An LVDROP report should be submitted with the design for certification where applicable.

Street Lighting

For projects containing public street lighting, the Level 3 ASP must include a completed CEOF6127 – Public Lighting: Installation and Connection Consent in their design package submitted for certification. CEOF6127 must be signed by an authorised officer of the local council.

CEOF6127 formalises council's agreement:

- That the street lighting design must comply with AS1158.
- To pay annual charges for the lighting applicable from the date of energisation
- To any other project specific requirements

The requirement to submit CEOF6127 applies to both new lighting and upgrades of existing lighting.

Preventing Interference to Other Network Customers

Level 3 ASPs must be aware:

All motor starting must comply with the NSW Service and Installation Rules. Motors will require an approved form of reduced current starting, and motor re-starting to be delayed or non-automatic (manual) following a power outage.

Large motors, arc furnaces, rectifiers (e.g. welders), large inverters, single phase to three phase converters, x-ray machines etc. can degrade the power quality at the customer's own installation and cause adverse effects to the supply of other customers and to Essential Energy's equipment e.g. interference with the frequency injection signal.

The effects from such equipment on power quality may include:

- Voltage sags and swells;
- Harmonics & Inter-harmonics;
- Voltage fluctuations;
- Voltage unbalance;
- Impulsive and oscillatory transients;
- Notching.

Any new load must comply with the relevant Australian Standards, NSW Service and Installation Rules and the Electricity Supply Act 1995 to prevent interference to other customers and electrical equipment.

Level 3 ASPs must notify Essential Energy if it is determined that the customer's load is likely to cause interference to Essential Energy's network.

Entry into Private Property

Only an authorised officer of Essential Energy may exercise Notice of Entry powers described in the NSW Electricity Supply Act 1995.

Level 3 ASPs providing contestable design services are not authorised officers of Essential Energy.

During a design investigation, the Level 3 ASP and/or their customer, must obtain the land owner or occupier consent to enter the land and carry out surveying and design related tasks.

Schedule of Documents to be submitted with the Certification Package:

- ☐ Electrical plan for certification (in pdf and dwg format)
- ☐ LVDROP report showing voltage drop calculations
- ☐ Pole and conductor loading calculations
- ☐ Neutron earthing report
- ☐ Designer safety report
- ☐ Site Specific Vegetation Clearing Management Plan (where applicable)
- ☐ Evidence of easement creation or Deed of Agreement
- ☐ All Local Council, Land Occupier, RMS and other authority correspondence and consent
- ☐ Enhancement Letters
- ☐ CEOF9082 – Consent Form – Customer Funded Project.
- ☐ CEOF9093 – Consent Form – Schedule of Works Required.
- ☐ CEOF6127 – Public Lighting: Installation and Connection Consent.
- ☐ CEOF6011 – Design Submission Form
- ☐ CEOF6283 – Contestable Works: Pioneer Scheme Application (Land Owner Only) or
  CEOF6283.01 – Contestable Works: Pioneer Scheme Application (Land Owner and Leaseholder)
- ☐ CEOF1070.01 – Environmental Impact Assessment: Screening Worksheet
- ☐ CEOF1070.02 – Review of Environmental Factors Worksheet and related searches and approval documents
- ☐ CEOF2098 – Company Form (Network) Returned Redundant Materials Check List
- ☐ AHIMS Report
- ☐ Flora / Fauna search results
- ☐ Dial Before You Dig (DBYD) reference number

Essential Energy forms are available at: www.essentialenergy.com.au/content/contestable-works

Incomplete or incorrect certification packages will be rejected (Design rechecking charges will apply to subsequent submissions).

Design information issued by **Name**: Robert Zaragoza

Contact Number: 02 6933 5874

List of attachments:

- ☐ Smallworld
- ☐ Enmac
- ☐ Pole Data
- ☐ Environmental Report

Easement guidelines

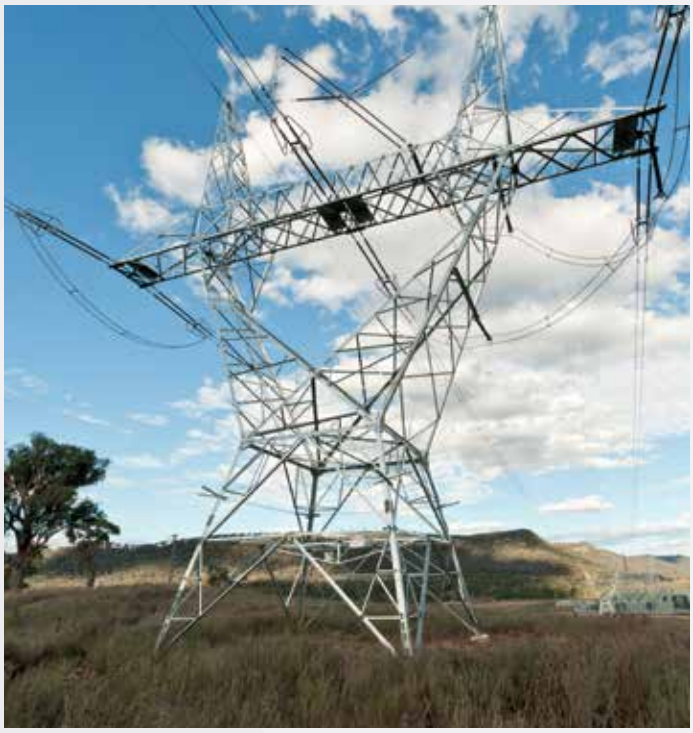
Living and working with electricity transmission lines

We all rely on electricity to power our homes and businesses, however coming into contact with high voltage electricity can cause serious injury or death.

To protect your safety and provide a safe, reliable network, TransGrid has easements over its transmission lines, which restrict the activities that can be carried out. Easements are also “rights of way”, which allow our staff and contractors access to construct, operate and maintain TransGrid’s infrastructure.

TransGrid’s primary concern is the **safety of people and the environment**, and we are committed (and required by legislation) to providing a safe and reliable transmission network.

For more information on potential electrical safety risks, please see our **Electrical safety risks fact sheet**. You can learn more about electricity infrastructure by reading our **High voltage transmission line fact sheet**.



What activities may be carried out within or adjacent to transmission line easements?

High voltage transmission lines have different safety risks from urban powerlines, and this is why TransGrid encourages the principle of "prudent avoidance"[1]. When planning houses, schools, sensitive land uses and other types of new development, proximity to existing or planned high voltage transmission lines should always be considered.

Where developments cannot avoid transmission line easements, open space uses – that do not encourage people to congregate under the transmission lines or close to electricity infrastructure – should be given preference over other land uses, such as residential or commercial.

These guidelines will assist you to work out:

> whether your proposed activity or development within (or adjacent to) an electricity easement is **permitted**; **requires TransGrid's permission**; or is **prohibited**; and

> the process for seeking TransGrid's permission prior to carrying out the activity or lodging your development application with a consent authority.

TransGrid can only give its permission to your proposal as holder of the easement. TransGrid's permission is not a development consent.

Councils are required to refer development applications that affect TransGrid's transmission line easements to TransGrid. Seeking TransGrid's permission prior to lodging your development application will help expedite this process.

If you undertake an activity or development that is not in accordance with the Easement guidelines, you may be required to remove it or relocate it at your expense.

Please note that if you have received TransGrid's written permission under previous guidelines, this permission remains valid.

Is your proposal located within or adjacent to a TransGrid easement?

Transmission line easements vary in width depending on the operating voltage and design of the infrastructure. Generally, the higher the voltage, the wider the easement. Figure 1 below shows the typical widths of transmission line easements.

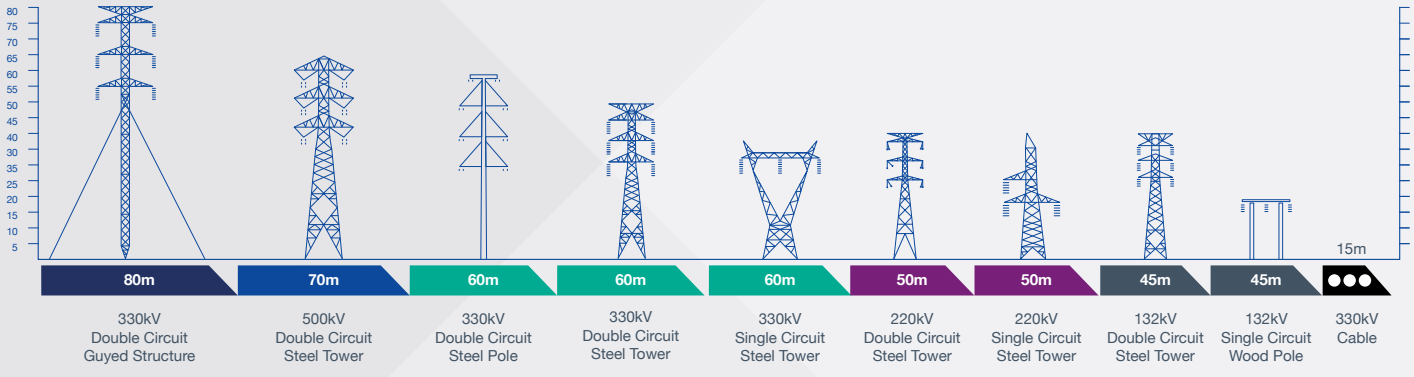


Figure not to scale. Typical widths only, may vary on a case by case basis.

Figure 1: Typical Easement Widths

[1] As identified by The Right Honourable Harry Gibbs Report, Inquiry into Community Needs and High Voltage Transmission Line Development, 1991.

The distances in the Easement guidelines are based on the typical easement widths shown in Figure 1. However, because there are some variations to easement widths, you will need to know the width of the easement near your proposal.

To work out whether there is a TransGrid easement on your property and how wide it is, you can contact the New South Wales Land Registry Services for a detailed survey plan.

NSW Land Registry Services can be contacted on 1300 052 637 or via their website at **www.nswlrs.com.au**.

Is your proposal outside the exclusion zone?

TransGrid has developed an **exclusion zone** to enable suitable activities within easements, while providing a safe clearance area around TransGrid transmission lines and structures to protect public safety and the network.

Please check the criteria and diagrams below to ensure that your proposal is outside the exclusion zone.

If your proposal is located within the **exclusion zone**, you will need to relocate it or seek permission from TransGrid. Most activities are prohibited within the **exclusion zone**, to meet TransGrid's public safety obligations.

Exclusion zone criteria activities/developments/structures must:

1. not impede TransGrid's access to its transmission infrastructure;
2. where transmission lines are **132kV and below:**
   - be located at least 20 metres away from any part of a transmission structure or guy wire;
   - for metallic structures, be located at least 22 metres away from any part of a transmission structure or guy wire;
   - be located at least 10 metres from the centre of the transmission line;
3. where transmission lines are **220kV and above:**
   - be located at least 30 metres away from any part of a transmission line structure or guy wire;
   - be located at least 17 metres from the centre of the transmission line.

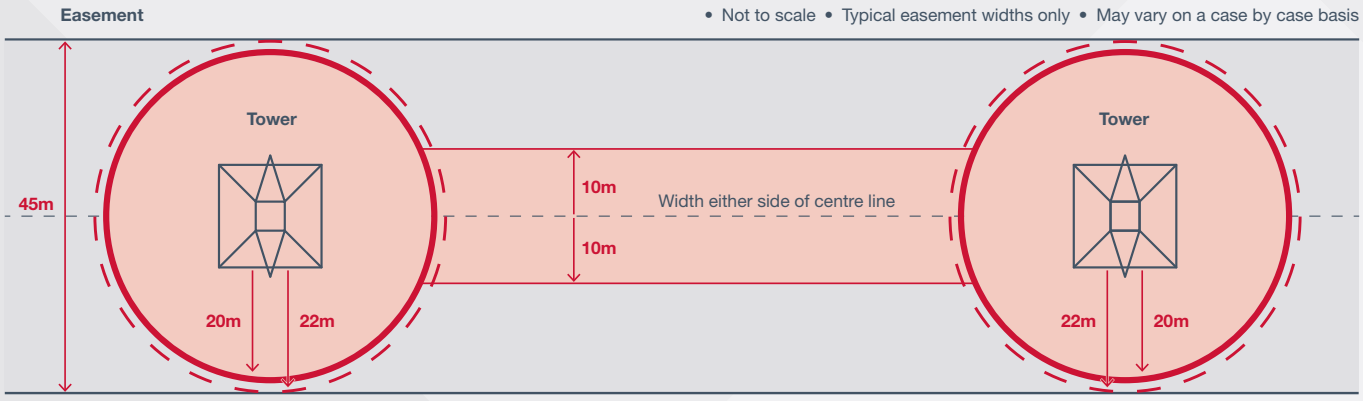


Figure 2: 132kV and below Exclusion Zone

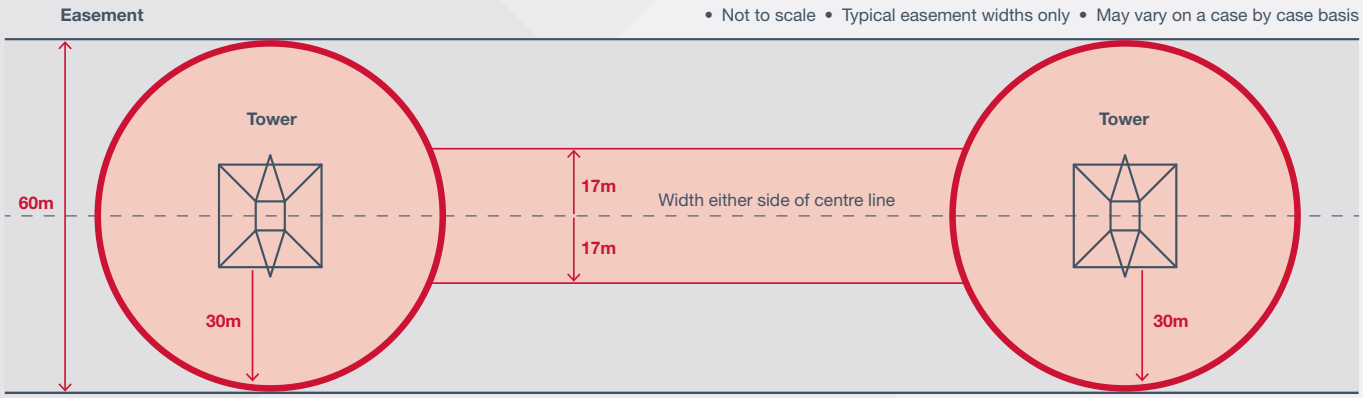


Figure 3: 220kV and above Exclusion Zone

If you are uncertain whether your proposal is within the exclusion zone, please contact TransGrid by submitting an enquiry via our online Easement Enquiries Portal: https://www.transgrid.com.au/being-responsible/public-safety/Living-and-working-with-electricity-transmission-lines

Is your proposal permitted within TransGrid easements?

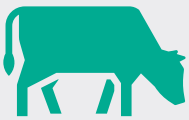
If your proposal is described below and is outside the **exclusion zone,** no further permission from TransGrid is required.

Where your proposal within a transmission line easement will require development consent, the consent authority must still refer the development application to TransGrid. For this reason, we recommend you seek TransGrid's confirmation that your proposal is permitted within the easement **before** you lodge your development application with Council, by submitting an enquiry via TransGrid's online Easement Enquiries Portal.

Please note: TransGrid reserves the right to review each activity individually and apply controls on a case-by-case basis. TransGrid will take into account public safety risks, and the safe operation, access and maintenance of TransGrid's electricity infrastructure.

If you are unsure whether your proposal is **permitted,** please contact TransGrid by submitting an enquiry via our online Easement Enquiries Portal.

The following activities where located outside the **exclusion zone** are **permitted** within TransGrid's easements:



Cropping and grazing, provided:

1. Machinery cannot extend more than 4.3 metres above ground level

Note: Exclusion zone requirements to be at least 10/17 metres from the centre of transmission lines do not apply to cropping and grazing, however all other exclusion zone requirements apply. TransGrid's Fencing guidelines must be complied with.

All other agricultural activities including irrigation, provided:

1. Machinery cannot extend more than 4.3 metres above ground level
2. All fixed metallic objects are earthed
3. Machinery, including irrigation, must remain outside the exclusion zone
4. No solid jet of water is to be within 4 metres of overhead conductors
5. Must use non-metallic piping
6. No fuel storage
7. No transmission line outages are required to undertake agricultural activities

Note: TransGrid's Fencing guidelines must be complied with.

Planting or cultivation of trees and shrubs, provided:

1. Mature plant / tree height is less than 4 metres

Short flag poles, weather vanes, single post signs, provided:

1. Height above ground is no greater than 4.3 metres
2. Non-climbable
3. All fixed metallic parts are earthed

Vehicle parking provided:

1. Height of vehicles no greater than 4.3 metres
2. No flammable liquid containers or carriers

3. Caravans are not occupied or connected (ie, temporary parking only)
4. All fixed metallic parts are earthed

*Note: **Lighting** requires TransGrid's permission to meet height and electrical safety constraints.*

Public open spaces, such as fields, cycle ways, walkways or fenced dog parks, provided:

1. No unmanned aerial vehicles (drones), kite flying or model aircrafts, and "warning signs" are installed
2. Any structures, obstructions, seating or features (such as picnic areas) are located outside the exclusion zone and do not block access tracks to transmission line structures or guy wires
3. Parallel roads, walking tracks, footpaths, cycleways and fenced dog parks are located outside the exclusion zone

Note: Roads, tracks, footpaths, cycleways and fences which propose to cross the transmission line as a thoroughfare, require TransGrid's permission.

Storage, provided:

1. No greater than 2.5 metres height
2. Stored material is non-flammable and non-combustible
3. Non-corrosive or explosive materials
4. No garbage, refuse or fallen timber or other material which could pose a bush fire risk
5. Metallic objects earthed

Operation of mobile plant and equipment, provided:

1. It cannot be extended more than 4.3 metres in height within easement
2. Equipment or plant do not encroach into Ordinary Persons Zone - please refer to the WorkCover *NSW Work Near Overhead Power Lines Code of Practice 2006 (https://www.safework.nsw.gov.au/__data/assets/pdf_file/0020/52832/Work-near-overhead-power-lines-code-of-practice.pdf)*
3. Work is carried out by accredited persons in accordance with WorkCover NSW *Work Near Overhead Power Lines Code of Practice 2006 (https://www.safework.nsw.gov.au/__data/assets/pdf_file/0020/52832/Work-near-overhead-power-lines-code-of-practice.pdf)*

Non-electric fencing and yards, provided:

1. No greater than 2.5 metre height
2. Fencing does not restrict access to TransGrid assets
3. Metallic fencing is earthed
4. TransGrid's Fencing Guidelines are complied with

Note: Parallel metallic fencing has specific safety risks and requirements under the Fencing Guidelines.

Domestic recreational activities including structures, provided:

1. Structures must not be identified as requiring **TransGrid's permission** or **prohibited**
2. Structures must be non-metallic and no greater than 2.5 metre height
3. Floor area no greter than $20m^2$, where any portion is within easement
4. Not connected to electricity supply
5. Structures (including play equipment and BBQs) must remain outside the exclusion zone
6. No unmanned aerial vehicles (drones), kite flying or model aircrafts

What if my activity does not meet the permitted criteria or is not listed above?

You will need to seek TransGrid's permission so that we can assess potential risks to your safety and the electricity transmission infrastructure.

Does your proposal require TransGrid's permission?

If your proposal does not meet the **permitted** criteria, it may fall within the following categories which **require TransGrid's permission**. Further information about the process for seeking TransGrid's permission is provided below, under "How can I seek TransGrid's Permission?"

TransGrid reserves the right to assess each request for permission on a case-by-case basis, taking into account public safety risks, and the safe operation, access and maintenance of TransGrid's electricity infrastructure.

TransGrid may grant permission with conditions, or may refuse permission where the activity could put public safety or the operation of the transmission network at risk.

If your proposal is described below and is **outside the exclusion zone,** you will **require TransGrid's permission:**

Any proposal which falls within a "permitted" catgegory but does not meet the listed criteria

Detached garages, carports, sheds, stables, pergolas and unroofed verandahs where no practicable alternative exists, provided:

1. Structures are no greater than 4.3 metres height
2. Non-habitable
3. Metallic structures are earthed
4. Floor area no greater than 20m^2, where any position is within easement
5. Power connection only permitted if electrically isolated in accordance with *AS/NZS 3000:2018 Electrical installations* outside easement

Sporting and recreational facilities, including tennis courts, basketball courts, playgrounds, exercise equipment provided:

1. Structures are no greater than 4.3 metres height
2. Metallic structures are earthed

Native plant or other nurseries, community gardens, provided:

1. Mature plant / tree height is less than 4 metres
2. Structures are no greater than 4.3 metres height
3. Any fixed structures, including pumps, are located outside the exclusion zone
4. Metallic structures must be earthed

Mobile plant with a height greater than 4.3m, provided:

1. It is operated by accredited persons in accordance with WorkCover *NSW Work Near Overhead Power Lines Code of Practice 2006 (https://www.safework.nsw.gov.au/__data/assets/pdf_file/0020/52832/Work-near-overhead-power-lines-code-of-practice.pdf)*

In-ground swimming pools including coping, provided:

1. It is located at least 30 metres from transmission line structures or supporting guy wires
2. Must be located at least 15 metres from transmission line centre (132kV or below) OR 25 metres from transmission line centre (220kV or above)

3. Power connection only permitted if electrically isolated in accordance with AS/*NZS 3000:2018 Electrical installations* outside easement
4. Site specific assessment will be required by TransGrid

Lighting/external sources of power no greater than 4.3m height:

1. Non-climbable
2. Must be electrically isolated in accordance with AS 3000 outside easement

Note: Exclusion zone requirements to be at least 10 metres from centre of 132kV and below transmission lines or 17m from centre of above 132kV lines do not apply to lighting and external sources of power, however all other exclusion zone requirements apply.

Electric fencing, where:

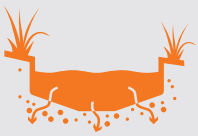
1. Height is no greater than 2.5 metres
2. Must be located at least 30 metres from transmission structures or supporting guy wires
3. TransGrid Fencing Guidelines are complied with

Roads and pathways that cross the transmission line as a thoroughfare:

1. Where it is proposed that a road passes within 30 metres of a transmission structure or supporting guy wires:
   - TransGrid may refuse consent or impose additional restrictions and other conditions
   - The structure's earthing system may require modification to prevent fault currents from entering other utility services in the road. The option of raising conductors or relocation of structures, at the full cost to the proponent, may be considered
2. TransGrid may require additional protection (such as safety barriers) where there is a risk of vehicle impact
3. Intersections shall not be located within the exclusion zone

Low voltage utilities and services such as electricity, gas, telephone and water:

1. Not located within the exclusion zone (additional clearances apply to metallic services)
2. Parallel metallic services will require specific safety assessment
3. Additional design and safety requirements will apply



Excavation, quarrying and earth works, including dam and artificial lake construction, basins, swales, drains and dispersion channels, provided:

1. No more than 3 metres in depth
2. No generation of significant amounts of dust or smoke that can compromise the transmission line high voltage insulation
3. Must not raise ground level, or reduce clearances below that required in *AS 7000:2010 Overhead line design*
4. No ponding or water retention around TransGrid's structures
5. Batter no steeper than 1 in 6 where access is required by TransGrid vehicles

Any other change in ground levels that reduce clearances below that required in AS 7000:2010 Overhead line design:

1. Criteria assessed on a case by case basis

Use of explosives:

1. Criteria assessed on a case by case basis

Mining:

1. Criteria assessed on a case by case basis

Subdivisions (see Subdivision and Development Guidelines):

1. Criteria assessed on a case by case basis
2. Subdivisions that encourage unauthorised encroachments (for example, where the majority of usable outdoor space in a proposed lot is located within a transmission line easement), will not be permitted, due to public safety risks

Is your proposal prohibited within a TransGrid easement?

If your proposal is described below, it is **prohibited** from being carried out within any part of a transmission line easement. This is due to the inherent risk to people, public safety, and to ensure the safe, reliable operation of the network.

Buildings, accommodation and structures:

1. Buildings or structures which are not listed as **permitted** or **require TransGrid's permission**
2. Construction of houses
3. Site construction offices or workshops
4. Camping or occupied caravans or other camping vehicles
5. Above ground pools

Fixed plant or equipments

Interference with transmission lines:

1. The placing of obstructions within 20 metres of any part of a transmission line structure or supporting guy wires
2. Placing any obstructions on access tracks or within the easement area that restricts access
3. Any structure whatsoever that during its construction or future maintenance will require an Accredited Person to access as per the WorkCover *NSW Work Near Overhead Power Lines Code of Practice 2006 (https://www.safework.nsw.gov.au/__data/assets/pdf_file/0020/52832/Work-near-overhead-power-lines-code-of-practice.pdf)*
4. The attachment of any fence, any signage, posters, or anything else, to a transmission line structure or guy wire
5. Any work that generates significant amounts of dust or smoke that can compromise the transmission line high voltage insulation
6. Movement of any vehicle or plant between tower legs, within 5 metres of a transmission line structure, guy wire or between a guy wire and the transmission pole
7. Kite flying or model aircraft within the easement, flying of remote controlled or unmanned aerial vehicles (such as drones), any manned aircraft or balloon within 60 metres of any transmission line structure, guy wire or conductor
8. Structures or objects that encourage or facilitate climbing (including working from vehicles)

Note: The final structure may meet AS7000 clearances, but may be accessible by Ordinary Persons within the Ordinary Persons Zone.

Storage of flammable, combustible, corrosive or explosive materials, garbage, refuse or fallen timber

Burning off or the lighting of fires

Unsafe work practices under Work Near Overhead Power Lines Code of Practice:

1. Any vegetation maintenance (such as felling tall trees) where the vegetation could come within the Ordinary Persons Zone as per the *WorkCover NSW Work Near Overhead Power Lines Code of Practice 2006*
2. Any activity (including operation of mobile plant or equipment having a height when fully extended exceeding 4.3 metres) by persons not Accredited or not in accordance with the requirements of the *WorkCover NSW Work Near Overhead Power Lines Code of Practice 2006*.

What about underground cable easements

Different risks and requirements apply near TransGrid transmission cables. For further guidance, please see the **Working near TransGrid cables guidelines**.

Underground cables are not obvious, and you may not know there is one located on your property. A **Dial Before You Dig (DBYD)** search is essential prior to any excavation works.

Given the nature of underground cables, all proposals within cable easements require TransGrid's permission.

Please note: TransGrid reserves the right to review each activity and apply controls on a case-by-case basis, taking into account public safety risks, and the safe operation, access and maintenance of TransGrid's electricity infrastructure.

How can I seek TransGrid's permission?

You can seek TransGrid's permission to carry out proposals within or adjacent to an easement via TransGrid's online Easement Enquiries Portal: https://www.transgrid.com.au/being-responsible/public-safety/Living-and-working-with-electricity-transmission-lines

This should be done **prior** to lodging your development application or planning agreement application with your consent authority. TransGrid's permission is given as holder of the easement only, and does not constitute approval to carry out the activity or development.

Please check that your proposal is consistent with these Easement Guidelines before you seek TransGrid's permission, so that we can respond as efficiently as possible.

Your request for permission should include the following information:

Name of applicant and/or company or Council	✓
Street address and Lot-DP	✓
Description of proposal with height, depth and location of proposed activities/ structures/ development and assessment of impact on transmission infrastructure	✓
Contact information including phone number, address and email address	✓
A detailed, legible and to-scale plan showing property boundaries, proposal and distance of proposal to TransGrid's easement and transmission line structures and guy wires (if applicable) For large scale subdivisions, a Site Plan showing all new access points and access ways to the easement and transmission line structures	✓
A three dimensional CAD drawing in 3D-DXF format	Only if proposal changes ground levels ✓

If we do not receive this information we may need to request further details from you, and this will delay your request for permission.

TransGrid has also prepared supplementary Technical Guidelines and Fact Sheets to provide additional information for specific activities:

> High voltage transmissions network fact sheet

> Electrical safety risks fact sheet

> Work near TransGrid cables

> Subdivision and development guidelines

> Fencing guidelines

> Working near TransGrid cables information brochure

These are available on the TransGrid website at **www.transgrid.com.au/being-responsible/public-safety/living-and-working-with-transmission lines**.

If your proposal is complex (for example, master-planned subdivision), we recommend a meeting with TransGrid before you submit your application for permission. You can arrange this via our online Easement Enquiries Portal.

Can I use TransGrid's permission as part of my development application to Council?

Your consent authority is required to consult with TransGrid before granting development consent for proposals that impact transmission line easements, or where the proposal might adversely affect electricity infrastructure.

Consent authorities must take into consideration any comments made by TransGrid within 21 days of written notification of a development application.

If you have received TransGrid's permission, this should be included as part of the development application. This will enable the referral process to be as efficient as possible.

If you have changed your proposal, you will need to lodge another request for TransGrid's permission via our online Easement Enquiries Portal, as your original permission will no longer be valid. This may delay the development application process.

Seeking TransGrid's permission and applying for development consent are two separate processes. TransGrid's permission does not allow you to carry out an activity nor does it guarantee development consent.

What if I build something without TransGrid's permission?

Please contact TransGrid to discuss on:

Phone: (02) 9620 0515

Email: Easements&Development@transgrid.com.au

Relocating or modifying infrastructure and interruption to transmission

Some proposals require modifications to existing electricity infrastructure or easements.

A contract may be needed with TransGrid where you will be required to pay TransGrid's costs, such as design and construction works.

You can make a modification enquiry with TransGrid's Infrastructure team at **infrastructure@transgrid.com.au** or find further information on our website: **https://www.transgrid.com.au/what-we-do/our-network/connections-and-modifications/network-modifications/Pages/default.aspx**

You will also be responsible for any costs incurred as a consequence of interruptions to TransGrid's transmission operations arising from the development.

Contact TransGrid

If you are uncertain or require further information regarding works around or in TransGrid easements, please contact us via our online Easement Enquiries Portal: https://www.transgrid.com.au/being-responsible/public-safety/Living-and-working-with-electricity-transmission-lines

You can also reach us by contacting:

Phone: (02) 9620 0515

Email: Easements&Development@transgrid.com.au

TransGrid Easement Guidelines

Third Party Development

Background

TransGrid acquires Transmission Line (**TL**) and cable easements to provide adequate clearance along the route of a TL for construction and maintenance work and to preserve certain property rights in perpetuity. These easements also ensure no work or other activity is undertaken under or near a TL or cable that could create an unsafe situation either for persons or for the security of the TL or cable.

The TL or cable easement area and its ongoing maintenance are control measures that cannot be compromised. Easements are established to prevent and mitigate against the following electrical safety risks:

- Infringement of electrical safety clearances e.g. due to an activity or vegetation growth;
- Electrical Induction e.g. due to parallel conducting materials;
- Step and touch potentials under fault conditions e.g. due to lightning or bushfire;
- Failure of structures or line equipment e.g. due to third party vehicle or plant impact;
- Transfer off easement of dangerous voltages, e.g. by services installed within the easement area; and
- Blowout of a conductor under high wind (or blow in of vegetation) e.g. into an adjacent structure.

TransGrid's paramount concern is the safety of people and property. TransGrid is also bound to maintain its infrastructure efficiently and cost effectively. The TL and cable easements, along with the accesses, have been designed to facilitate effective operational maintenance.

Development Approval Process

The *Environmental Planning and Assessment Act 1979* may empower Local Councils to act as the consent authority for development applications. In these situations, a Development Application (DA) is prepared and submitted to the Local Council for development consent.

The *State Environmental Planning Policy (Infrastructure) 2007* (SEPP), which commenced on 1 January 2008, requires Local Councils to consult with Electricity Network Operators before granting development consent for proposals that might adversely affect:

- existing electricity infrastructure; and
- easements for electricity purposes, even if no infrastructure has yet been constructed in the easement.

The Local Council must take into consideration any comments made by the Electricity Network Operator who has 21 days to respond to any written notification of a DA received by Council. Council must take into consideration any comments provided by the Electricity Network Operator before it determines any DA. TransGrid's initial response may be a request for additional information to assess a development that seeks to encroach or is immediately adjacent to our easements and infrastructure. Such a request is likely to then be forwarded to the applicant.

The party submitting the development application is required to consult with TransGrid in accordance with the *State Environmental Planning Policy (Infrastructure) 2007* (**SEPP**); the *NSW Occupational Health and Safety Act 2000*; the WorkCover NSW *'Work Near Overhead Power Lines'* Code of Practice 2006, and; the WorkCover NSW *'Work Near Underground Assets'* Guide 2007.

TransGrid Approval

The statutory approval authority should obtain a written approval from TransGrid for all proposed activities within an easement area in accordance with regulation 45 of the *SEPP.*

It is recommended that the development proponent consult with TransGrid prior to lodging a DA, so the proposed development may be assessed relative to TransGrid's easements and infrastructure within the specific locality. Statutory notification pursuant to regulation 45 of the SEPP may not always provide an adequate response time for TransGrid to assess any development proposed within or immediately adjacent to our easements and infrastructure. Therefore, it is considered to be in the best interests of any development proponent to thoroughly consult and attempt to resolve all and any issues with TransGrid prior to submitting a DA. In consulting with TransGrid prior to submitting the DA, the following information must be provided.

1. Detailed specifications and plans drawn to scale and fully dimensioned, showing property boundaries and other relevant information. Survey plans must clearly identify TransGrid's easements; any high voltage transmission infrastructure located therein (including stanchions); and horizontal clearances;

2. Three dimensional CAD file of the development, preferably in 3D-DXF format; and

3. TransGrid will also require an *Impact Assessment* of the development on TransGrid's infrastructure and associated interests (including easements). Details of how any adverse impacts will be managed, mitigated or resolved must also be provided. The *Impact Assessment* form is contained in **Appendix A** of these guidelines.

Upon receipt of the abovementioned documentation, TransGrid will assess the proposed development in relation to its impact on TransGrid infrastructure, easements and means of access. For complicated proposals the consultation process will be comprehensive and the proponent should allow sufficient time for this process prior to lodgement of a DA (see *Timeframes* below).

General Development Proposal Guidelines

1. Prohibited Activities and Encroachments

A number of activities and encroachments are not permitted within the easement area. These are detailed in the "TransGrid Easement Guide" contained in **Appendix B** of these guidelines.

Any *Development Proposal* should be designed in such a way that:

- It does not involve the listed activities, nor introduce the identified encroachments; and
- Does not encourage other parties to undertake such activities or introduce such encroachments in the future.

2. Development

The Development Proposal should be planned taking into consideration the policy of "*prudent avoidance*" as identified by The Right Honourable Harry Gibbs Report (*Inquiry into Community Needs and High Voltage Transmission Line Development*).

This report placed recommendations on the design of new TL's having regard to their proximity to houses, schools, work sites and the like and is equally valid when considering new developments proposed in proximity to existing powerlines and associated easements.

The policy not only considers electrical safety risks it also takes into consideration Electric and Magnetic Field (EMF). The EMF strength rises from the easement edge to beneath the conductors and the most practical way to achieve *prudent avoidance* is to keep any development entirely outside the easement area.

If it is desired to place any part of a development within an easement the proponent shall, in conjunction with the *Development Proposal*, undertake an *Impact Assessment* (see **Appendix A**) to be provided to TransGrid that covers the changes in risk and mitigation measures proposed. General development requirements are listed in **Appendix C**.

Relocating Infrastructure and Interruption to Transmission

The development proponent will be liable for any costs involved in any agreed relocation of TransGrid infrastructure as part of any proposed development. Depending on how the development proposes to encroach on TransGrid's easement, an earthing study and earthing modifications may be required at the developer's expense. Further, the developer will also be liable for any costs and penalties incurred as a consequence of interruptions to TransGrid's transmission operations arising from the development, whether planned or inadvertent.

Post Construction Compliance Statement

The Development Proposal, as provided to TransGrid, must include as-built plans compliant with TransGrid's drawing management system of the final construction where approval of an encroachment is granted. The as-built drawings must be accurate, scaled and display distances/measurements, demonstrating compliance to the agreed plans and implementation of agreed control measures.

Timeframes

TransGrid will respond to a Local Council notification of a proposed development within 21 days as required in the SEPP, however that response may not be an approval (or disapproval). If the Development Proposal does not meet the requirements of these Guidelines, or in the event further detailed engineering analysis is required, TransGrid may require the Development Proposal to be revised and resubmitted or additional information will be sought.

Developers are advised to consider TransGrid's requirements early in the process as discussed and not as an afterthought that could result in project delays, including the future demolition of any prohibited construction works. To this extent, development proponents and their consultants are encouraged to contact and meet with TransGrid in the preliminary planning and design stages of the development in order to establish what restrictions and prohibitions apply and what, if any conditional encroachments can be accommodated.

Further Assistance

For any further development enquiry assistance please contact the Enquiries Services Coordinator:

Enquiries Services Coordinator	Telephone	(02) 9620 0104
	Mobile	0427 094 860
TransGrid Community Liaison Group	Phone	1800 222 537
	Email	community@transgrid.com.au
	Website	www.transgrid.com.au

Appendix A - Development Proposal Impact Assessment

Details of the Development

Street Address	
Land and Title References	
Encroachment and/or Proximity to Easement	
Development Proposal's Clearances to TransGrid's high voltage infrastructure	
Detailed plans of development attached	

Safety

Consideration	Yes/No (If Yes, please provide details and mitigation/ resolution)
Are ground levels being changed within or in the vicinity of the easement? If so, by how much?	
Is any part of the development proposed within 30m of a transmission line structure or guy? If so, how close to the structure/guy?	
Will the development increase earth potential rise risk? (If unsure please consult with TransGrid Enquiries Services Coordinator.)	
Will the development contain metallic structures or services in the easement?	
Will the development result in voltages being transferred off the easement or bring remote earths onto the easement? (If unsure, please consult with TransGrid's Enquiries Services Coordinator.)	
Are public spaces or recreational areas proposed within or adjacent to the easement?	
Will the development encourage people to congregate and/or spend time within the easement or immediately adjacent thereto?	
Are structures with a height greater than 2.5m proposed on the easement?	
Will an Elevated Work Platform (EWP) be required to maintain any structures within the easement?	
Is infrastructure proposed that is a fire hazard, or that would encourage the storage or use of flammable material on the easement?	
Is infrastructure proposed that would require emergency workers (such as fire fighters) to come near, or their equipment to come onto or near high voltage conductors?	

Consideration	Yes/No (If Yes, please provide details and mitigation/ resolution)
Will the easement or the nature of the land in the vicinity of the easement, be altered in any way that would encourage prohibited encroachments to occur within the easement?	
Will access around any TransGrid structure be altered preventing EWPs, crane or other plant access? (Required for TransGrid maintenance purposes.)	
Will the development introduce other risks to maintenance staff when working within the easement?	
Will access to the easement be altered that would introduce risks to TransGrid personnel including, although not limited to, asset inspectors or patrol staff?	

Operations

Consideration	Yes/No (If Yes, please provide details and mitigation/ resolution)
Have any ground level developments been proposed (including roads, driveways, parking lots and turning bays etc) that would expose TransGrid transmission structures and lines to impact risk? (If unsure please consult with the TransGrid Enquiries Services Coordinator.)	
Will the development result in a change in water flows or drainage that could impact on the foundations or structural integrity of any TransGrid structure or guy-wire?	
Are excavations or surface activities proposed that would impact a TransGrid structure's foundations, stability or subterranean earthing systems? (If unsure please consult with the TransGrid Enquiries Services Coordinator.)	

Maintenance

Consideration	Yes/No (If Yes, please provide details and mitigation/ resolution)
Have roads, driveways or landscaping been proposed that would prevent or hinder TransGrid maintenance, or increase maintenance costs, for the above or below ground components of the transmission line structure?	
Will access to the easement or within the easement, be obstructed, restricted or altered?	
Have access roads, bridges, crossings and the like been designed to cater for the weight and size of TransGrid maintenance plant (EWPs and Cranes)?	
Does the development encourage the placement of obstructions that would prevent access for routine or emergency works?	

Development Design & Construction

Consideration	Yes/No (If Yes, please provide details and mitigation/ resolution)
Has the development been designed so that during the construction phase TransGrid is not restricted from undertaking normal maintenance and inspection activities?	
Has the development been designed so that during the construction phase prohibited activities or encroachments are not required in the easement area?	
Has the design health and safety risk assessment complied with the following WorkCover NSW instruments: • '*Work Near Overhead Power Lines*' Code of Practice 2006; and/or • *'Work Near Underground Assets'* Guide 2007?	

TransGrid's Rights

Consideration	Yes/No (If Yes, please provide details and mitigation/ resolution)
Are TransGrid's existing access rights preserved, pursuant to the terms of the easement?	
Will TransGrid be exposed to new or higher maintenance costs (e.g. landscaping or other development changes impacting easement access, use and maintenance)?	
Does a new deed of easement need to be negotiated by the development proponent?	

Preservation of Easement for Access

Consideration	Yes/No (If Yes, please provide details and mitigation/ resolution)
Will TransGrid's *Easement for Access* be affected?	
Does a new *Easement for Access* need to be arranged by the development proponent, including to supersede an existing registered right of carriageway?	

Appendix B - Prohibited encroachments and activities

TransGrid will use its powers under the Electricity Supply Act, involve WorkCover or take other legal action as required to prevent or halt prohibited activities.

1. Transmission Lines

Activities and encroachments that are **prohibited** within a Transmission Line (TL) Easement include, but are not limited to *(Note 2)*, the following:

- The construction of houses, buildings, substantial structures, or parts thereof.
- The installation of fixed plant or equipment.
- The storage of flammable materials, corrosive or explosive material.
- The placing of garbage, refuse or fallen timber.
- The planting or cultivation of trees or shrubs capable of growing to a height exceeding 4 metres.
- The placing of obstructions within 20 metres of any part of a transmission line structure or supporting guy-wire.
- Camping or the permanent parking of caravans or other camping vehicles.
- Public spaces or recreational areas which encourage people to spend time within or congregate within the easement.
- The parking or storage of flammable liquid carriers or containers.
- The installation of site construction offices, workshops or storage compounds.
- Flying of kites or wire-controlled model aircraft within the easement area.
- Flying of any manned aircraft or balloon within 60m of any structure, guy-wire or conductor.
- Flying of remote controlled or autonomous aerial devices (such as UAVs) within 60m of any structure, guy-wire or conductor.
- Placing any obstructions on access tracks or placed within the easement area that restricts access.
- Any vegetation maintenance (such as felling tall trees) where the vegetation could come within the Ordinary Persons Zone – refer to the WorkCover NSW '*Work Near Overhead Power Lines*' - Code of Practice 2006'.
- Any substantial excavation within 15 metres of a pole or supporting guy-wire or guy foundation or within 20 metres of a tower
- The climbing of any structure (any development that encourages or facilitates climbing will not be permitted).
- Any change in ground levels that reduce clearances below that required in AS7000.
- The attachment of any fence, any signage, posters, or anything else, to a structure or guy-wire.

  Note: Interference to electricity infrastructure is an offence under the *Electricity Supply Act 1995*.
- The movement of any vehicle or plant between the tower legs, within 5m of a structure, guy-wire or between a guy-wire and the transmission pole.

  Note: Any damage to electricity infrastructure is an offence under the Electricity Supply Act 1995.
- The storage of anything whatsoever within the tower base or within 10m of any tower leg.
- Any structure whatsoever that during its construction or future maintenance will require an Accredited person to access.

  Note: The final structure may meet AS7000 clearances, but may be accessible (e.g. by EWP) by Ordinary Persons within the Ordinary Persons Zone.
- Any work that generates significant amounts of dust or smoke that can compromise the TL high voltage insulation.
- The erection of any structure in a location that could create an unsafe situation work area for TransGrid staff.
- Burning off or the lighting of fires.

- Any activity (including operation of mobile plant or equipment having a height when fully extended exceeding 4.3 metres) by persons not Accredited or not in accordance with the requirements of the WorkCover NSW 'Work Near Overhead Power Lines' Code of Practice 2006 that is within (Note 1):
  - 3m of an exposed 132kV overhead power line
  - 6m of an exposed 220kV or 330kV overhead power line
  - 8m of an exposed 500kV overhead power line

  Note: Distances quoted are to the design conductor position (i.e. maximum sag and blowout)

The following activities <u>may possibly</u> be approved with conditions. TransGrid's prior written consent is required. The proponent will have to demonstrate (using the Impact Assessment process) that the risks associated with the activity have been satisfactorily mitigated.

- Temporary parking of caravans and other large vehicles in the outer 3m of the easement area, subject to a 4.3 metre height restriction and metallic parts being earthed.
- The erection of flagpoles, weather vanes, single post signs, outdoor lighting, subject to a 4.3 metre height restriction and metallic parts being earthed.
- The erection of non-electric agricultural fencing, yards and the like.

  Note: Fencing that exceeds 2.5 metres in height or that impedes access would not be approved.
- The erection of metallic fencing less than 2.5 metres in height providing that it is earthed, located more than 20 metres from any part of a transmission line structure or supporting guy and greater than 4 metres of the vertical projection of the overhead conductors.
- The erection of electric fencing provided that the height of the fencing does not exceed 2.5 metres and provided that the fence does not pass beneath the overhead conductors.

  Note: Approval may be given for a portable electric fence to pass underneath the conductors provided that it is supplied from a portable battery-powered energiser that is located remotely from frequented areas. Where it is necessary for a permanent electric fence to pass beneath the overhead conductors, or where an extensive permanent electric fencing system is installed in proximity to a transmission line certain additional safety requirements will be required.
- The installation or use of irrigation equipment inside the easement.

  NOTE: An irrigation system will not be approved if it is capable of coming within 4 metres of the overhead conductors; exceeds 4.3 metres in height; consists of individual sections of rigid or semi-rigid pipe exceeding 4.3 metres; is capable of projecting a solid jet of water to within 4 metres of any overhead conductors; requires fuel to be stored within the easement; and/or requires an outage of the transmission line for it's operation.
- The installation of low voltage electricity, telephone, communication, water, sewerage, gas, whether overhead, underground or on the surface.

  Note: Services that do not maintain standard clearances to the overhead conductors that are within 15 metres from the easement centre-line, 20 metres from any part of a transmission line supporting structure or are metallic and within 30 metres of any part of a structure will not be approved. TransGrid may impose additional conditions or restrictions on proposed development.
- The installation of high voltage electricity services, subject to there being no practicable alternative and provided the standard clearances are maintained to the supporting structures.

  Note: Where extensive parallels are involved certain additional safety requirements may be imposed by TransGrid, depending on the particular case and engineering advice.
- Swimming pools, subject to TransGrid's strict compliance criteria.

  Note: Above ground pools will not be approved. In-ground pools will not be approved if there is a practicable alternative site clear of the easement area. If there is no practical alternative site, in-ground

pools including coping will not be approved if it encroaches more than 4.5 metres, or is less than 30 metres away from a transmission line structure. A site specific assessment by TransGrid is required.

- Detached garages, detached carports, detached sheds, detached stables, detached glass houses, caravans, site containers, portable tool sheds, pergolas and unroofed verandahs attached to residences on the outer 3 meters of the easement only.
- Prefabricated metal (garden) sheds. TransGrid approved sheds must be earthed.

  Note: Sheds exceeding 2.5 metres in height, with a floor area exceeding 8m², encroaching more than of up to 3 metres or within 30 metres of any part of a transmission line structure will not be approved. Connection of electric power will not be approved.
- Single tennis courts.

  Note: Tennis courts that hinder access are for commercial use or do not provide adequate clearances shall not be approved.
- Subdivisions. See ***Appendix C*** requirements.
- Roads, carparks, cycleways, walking tracks and footpaths on the outer part of the easement or as a thoroughfare across the easement, subject to horizontal and vertical clearances. Restrictions and other conditions on consent may also apply. These will not be approved when located within:
  - 20 metres of any part of a transmission line structure
  - 10 metres of the centre-line of a transmission line 132kV and below
  - 17 metres of the centre-line of a transmission line above 132kV

  Note: Roads and pathways that cross the transmission line as a thoroughfare may be permitted. Where it is proposed that a road passes within 30 metres of a transmission structure or supporting guy, TransGrid may refuse consent or impose restrictions and other conditions on consent. Where a road passes within 30 metres of a transmission structure or supporting guy, the structure's earthing system may require modification for reasons including, but not limited to, preventing fault currents from entering utility services which may be buried in the road. The option of raising conductors or relocation of structures, at the full cost to the proponent, may be considered.
- Excavation – subject to restriction criteria.

  Note: Substantial excavations located within 20 metres of any part of a steel tower or pole structure and exceeding a depth 3 metres will not be approved.
- Quarrying activities, earthworks, dam or artificial lake construction.
- Mining. Approval would be based on the merits of the proposal and any related circumstances.
- Use of explosives.

Note 1: An encroachment or activity that is located outside the prohibited distance of the infrastructure but still within the easement will not necessarily be permitted. It will generally need to be addressed in the Impact Assessment and remains subject to TransGrid prior consent.

Note 2: The above list is not exhaustive and if there is any uncertainty as to whether an activity or encroachment is acceptable within an easement, please contact TransGrid. TransGrid may impose additional conditions or restrictions on proposed development.

2. Cables

The location of TransGrid's subterranean infrastructure and associated easements includes, but is not limited to, beneath private freehold and strata land as well as public roadways and railways etc. All development proposed within immediate proximity of TransGrid's subterranean infrastructure, including high voltage cables, stratum tunnels and conduits, must undertake a *Dial Before You Dig* search of any land where development is proposed, including roads adjoining a development site where subterranean services are proposed to be installed. The activities listed below are prohibited within cable easements:

- The storage of flammable liquids or explosives
- The planting or cultivation of trees or shrubs with extensive root systems
- The construction of houses, buildings or substantial structures
- The installation of fixed plant or equipment
- The placing of garbage, refuse or fallen timber
- Boring directly over the cable lay (eg. the installation of fencing or safety railing)
- The raising or lowering of existing ground surface levels
- Any excavation within 2m of an underground cable.

The following activities may be approved with conditions. TransGrid's prior written consent is required. The proponent will have to demonstrate (using the Impact Assessment process) that the risks associated with the activity have been satisfactorily mitigated.

- Parking of vehicles

  Note: Parking will be prohibited if the surface is not capable of supporting the vehicles likely to be parked, risking the crushing of the cable/ducts or erosion of the ground

- The operation of mobile plant and equipment

  Note: Such operations will be prohibited if the surface is not capable of supporting the vehicles likely to be parked, whereby risking the crushing of the cable/ducts or erosion of the ground

- The erection of structures spanning the easement
- Excavation
- Concrete driveways
- The installation of metallic pipes, fences, underground or overhead cables and services
- Road-boring within approved distances of a high voltage cable.

Where TransGrid's prior written consent has been granted to undertake work near an easement and related subterranean infrastructure, including the tunnels and conduits that accommodate our high voltage transmission line cables, all works must be undertaken in accordance with the WorkCover NSW 'Work Near Underground Assets' Guide 2007. Further, all development works must comply with the TransGrid guidelines for subterranean infrastructure referring to the document titled "*Requirements for Working In the Vicinity of TransGrid Underground Cables".*

Appendix C - General Requirements for Developments and Subdivisions

The following list of current general requirements is provided for your information. It should be noted that the list is not exhaustive and, where there is any doubt concerning a particular activity within the easement area advice should be sought from TransGrid.

1. Completed Works

The completed works shall provide for the following considerations:

- A safe unobstructed working platform shall be preserved around the transmission line structures for access by EWP, cranes as well as other large plant and equipment. No obstructions of any type shall be placed within 30 metres of any part of a transmission line structure.
- Roads, streets etc (including kerb to property boundaries) and intersections shall not be located within 30 metres of any TL structure.
- Developments must meet the clearances requirements set out in AS7000 between their finished level and the conductor at its maximum operating temperature.
- Proposed roadway locations shall also take into consideration any street lighting requirements to ensure that statutory clearance requirements are followed. The design clearances should include future maintenance safety issues. TL outages will not be provided for street light maintenance. Access to the TL and its structures shall be available at all times for TransGrid plant and personnel. In this regard a continuous and unobstructed access way shall be retained along the easement.
- Where fences are required for security purposes access gates will be installed in an agreed location and a TransGrid lock will be fitted.
- Application of “prudent avoidance” in relation to electric and magnetic fields should always be observed.
- No increase in earth potential rise risks.
- All underground services installed more than 20 metres but within 30 metres of a TL structure shall be non-metallic. Utility services (including street lighting), whether above or below ground, shall not be installed without prior written approval of TransGrid.
- Excavation work or other alterations to existing ground levels shall not be carried out within the easement area without the prior approval of TransGrid. Approval will not normally be granted for such work within 20 metres of any supporting structure.
- Boundaries for new subdivided properties should not be located within the easement.
- Fenced boundaries for all new properties in the subdivision shall not be within 30 metres of any TL structure.
- A “Restriction-as-User” (88B Instrument) shall be placed on the titles of any created lots that may become affected by a TL easement. Any proposed activity within an easement area will require the prior written approval of TransGrid (appropriate wording will be advised when required).
- Any proposed development must not impact on TransGrid’s costs of inspecting, maintaining or reconstruction of the transmission lines.
- In order to comply with its statutory responsibilities to maintain adequate clearance between the conductors and any forms of vegetation, TransGrid maintains its easements as follows:
  - Tall growing species likely to infringe safe clearances are to be removed regardless of existing height at time of construction.
  - Trees likely to fall onto conductors or towers are also to be removed whether on the easement or off the easement (ref. Sec 48 of the Electricity Supply Act 1995).

- Shrubs and other vegetation of lower mature height within the easement will be reduced and managed, generally by slashing with ground level retained.
- Vegetation management will aim to reduce available fuel and subsequent bushfire risks in accordance with NSW Rural Fire Service Bush Fire Environmental Assessment Code that sets out the requirements for hazard reduction strategies such as Asset Protection Zones and Strategic Fire Advantage Zones.
- Removed vegetation will be mulched or chipped and removed from site or retained on site in accordance with owner/stakeholder requirements.
- Other works considered necessary in order to provide a safe working environment for maintenance staff, contractors and for the property owner/manager will be undertaken.

Proposed vegetation plantings, such as Riparian corridors, within the transmission line easements shall be compatible with the above maintenance requirements and must consider on-going vegetation control.

2. Construction

During construction, the development plans shall also provide for the following considerations:

- Vehicles, plant or equipment having a height exceeding 4.3 metres when fully extended shall not be brought onto or used within the easement area without prior TransGrid approval.
- Where temporary vehicular access or parking (during the construction period) is within 16 metres of a transmission line structure, adequate precautions shall be taken to protect the structure from accidental damage. Plans need to be submitted to TransGrid for prior approval.
- The easement area shall not be used for temporary storage of construction spoil, topsoil, gravel or any other construction materials.

3. Costs

The Developer shall bear all costs of any specialist design studies, TransGrid supervision, reconstruction or modification of the transmission line and its components, including consultation and design required to maintain clearances due to proposed ground level changes; road crossings within the easement; or due to any damage to the TL arising from the development.

Example of the Required Working Platform for Transmission Tower Maintenance

TransGrid Fencing Guidelines

Earthing and isolation of fences in easements

TransGrid operates and maintains the high voltage electricity network across NSW and the ACT, which includes 99 substations and more than 12,900 kilometres of transmission lines and underground cables. The majority of this infrastructure is located on private land and is accessible by an easement.

An easement provides a 'right of way', allowing access for our staff and contractors to build and maintain electrical infrastructure on private property. If you have an easement registered on your property, there may be some restrictions on the activities performed or structures that can be placed within the easements, including fences.

All fences installed within TransGrid easements should be built with wooden or other non-conductive materials to minimise the risk of injury and/or damage to property. Where this is not possible and metal fences must be installed, certain requirements must be met and are outlined in these guidelines.

As the operator and manager of the high voltage transmission network across NSW and the ACT, TransGrid connects generators, distributors and major end users to the electricity they need, when they need it. At TransGrid, we keep you and your way of life connected. Our core role is to provide safe, reliable and efficient transmission services to NSW, the ACT and the National Electricity Market.

While transmission is a small component of the electricity bill, around 7% for households and businesses, we do not believe that consumers should pay more than necessary for a reliable electricity supply.

Our network comprises 99 bulk supply substations and more than 12,900 kilometres of high voltage transmission lines and cables. Interconnected to QLD and VIC, the network provides a strong electricity system enabling energy trading between Australia's three largest states along the east coast and supporting a competitive wholesale electricity market.

We believe in working with the communities we operate in. We help them learn about energy through our BeSafeKidz primary school education program. Each quarter we partner with different communities to support them grow and develop through our Community Partnership Program. While our easement teams work with landowners to ensure the safety of easements. For more information visit our website www.transgrid.com.au.

Risks posed by metal fences on easements

If a metal fence is installed near a high voltage transmission line, there is a possibility it could act as a conductor of electricity and dangerous currents may be carried along the fence.

These voltages may be an induced voltage from the fence being parallel to a nearby transmission line, or they may be a transferred voltage (or transferred potential), which occurs when a fence is installed too close to the high voltage transmission pole or tower (structure).

The amount of induced or transferred voltage can vary between different transmission lines and structures, and is also affected by the soil beneath the transmission line.

In some cases where a metal fence must be installed, TransGrid may request a detailed earthing assessment and additional measures may be required beyond those outlined in this guideline.

Ensuring the safety of existing metal fences

In some easements, metal fences have been installed by previous owners. It is important these existing fences meet TransGrid's guidelines to minimise the risk of injury or damage to property. This section outlines the guidelines for a fence which is located near or adjacent to a structure, or runs parallel to a transmission line. Despite the location of the fence, you should always follow these simple rules:

- A metal fence should never touch a transmission line structure
- A metal fence should always be at least 1m away from an underground earthing system

To find out the location of any underground earthing systems call "Dial before you dig" on 1100.

Fences near a structure

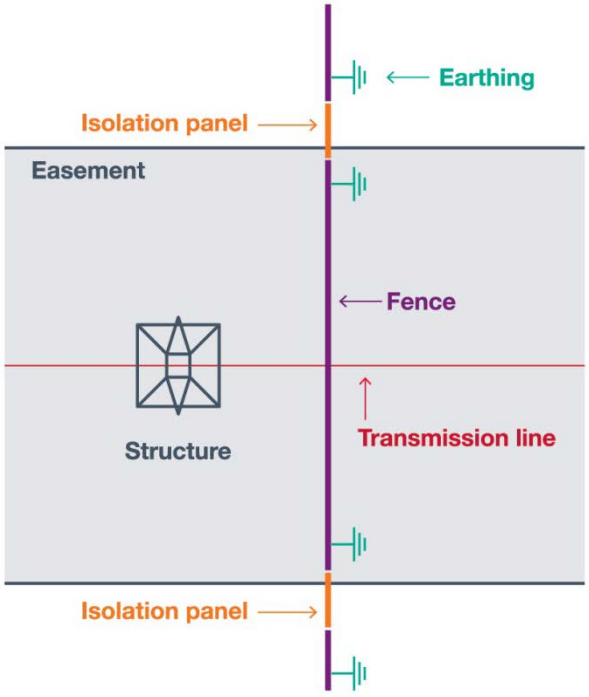
Metal fences that run across an easement, near the base of a transmission line structure, pose specific risks. To manage this risk the following steps must be taken:

- Install Isolation panels where the fence enters or exits the easement
- Provide earthing either side of the isolation panels

The diagram below (Diagram 1) shows an example where a fence runs across the easement. It is important the fence has isolation panels installed as it enters and exits the easement, ensuring it is earthed at either side. If the fence stops inside the easement, it will need to be earthed next to the last post.

If the fence is within 1m of the structure, the fence may need to be modified to ensure safety.

Metal fencing running across the easement near a structure

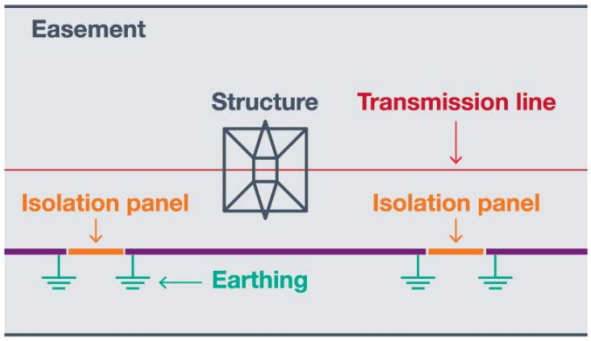


Fences parallel to a transmission line

Metal fences located within an easement and running parallel to a transmission line (see Diagram 2) also pose specific risks. To manage this, adhere to these requirements:

- Fences that run parallel with a transmission line past a structure should have earthing and isolation panels installed near each the structure
- An additional earth should be installed around the middle of each span if the fence passes more than one structure
- In addition to the above, any fence should be earthed at each end.

Metal fencing running parallel to the line in the easement



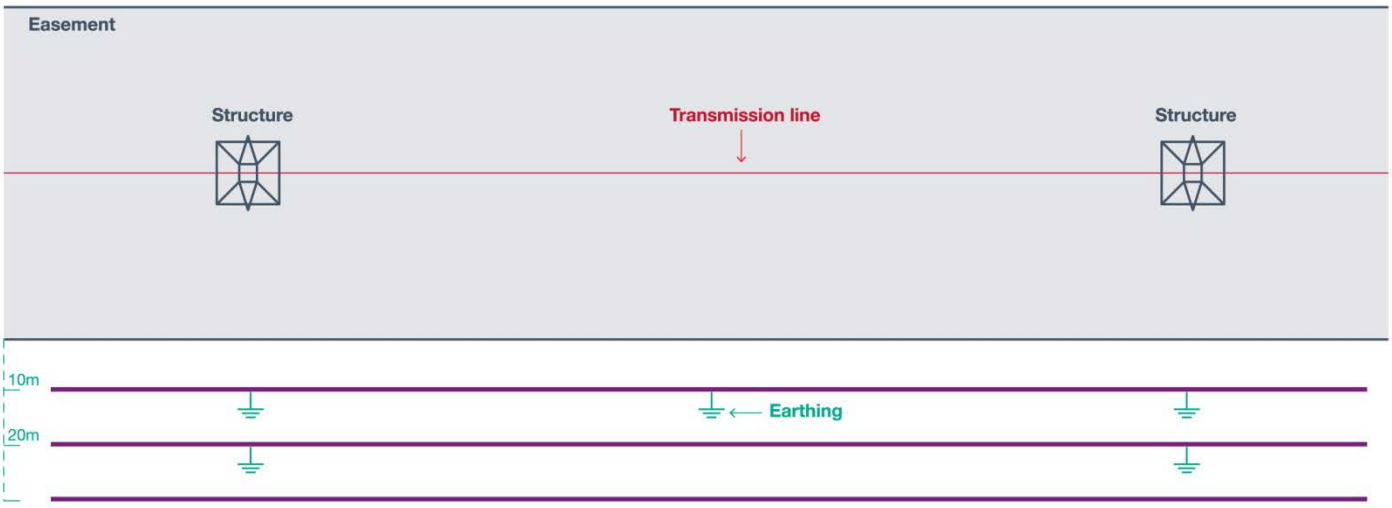
Fences outside the easement

The risk of transferred voltage reduces when the distance between the transmission line and the metal fence is greater. However, to minimise any potential risk of induced voltages, you must follow these requirements:

- Fences within 10m of the easement should be earthed once in line with each structure and once in the middle of each span
- Fences within 20m of the transmission line should be earthed once in line with each structure
- Fences more than 20m from the easement would not generally require earthing

The below diagram (diagram 3) shows the distance of a fence running parallel to an easement and the subsequent level of earthing required.

Metal fencing running parallel to the line on the edge of the easement



Installing a new metal fence in an easement

It is recommended all fencing located within an easement is made from wood or non-conductive materials. However, we understand in some cases metal fencing may be required. In these cases, follow these requirements to reduce the risks:

- Each separate strand of wire or metal fence panel should be effectively earthed at the edge of the easement, wherever the fence passes in or out of the easement area, and at any end of the fence located within the easement area
- Metal gates should be earthed by bonding across the hinges to the fence (in the case of a wire or other metal fence), or by suitable earthing arrangements at the gate post for fences of wooden construction
- All fence and gate earthing must be installed in accordance with the diagrams provided in this guideline.

Temporary fencing

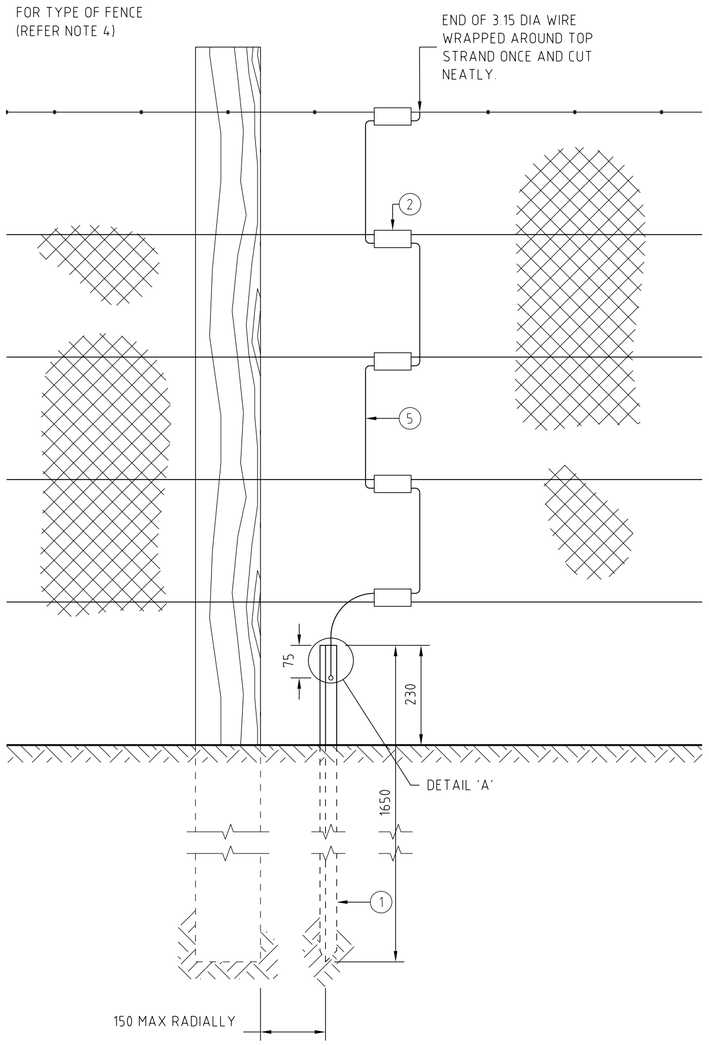
Temporary fencing installed within an easement needs to be earthed. Where a typical chain-wire or weldmesh panel fence supported by concrete or plastic block bases is used, every second panel should be earthed and the pipe clamp between posts of adjoining panel posts should be replaced with a clamp arrangement made of wood or other non-metallic material.

Other types of temporary fencing should be earthed and isolated in accordance with the requirements set out in this guideline.

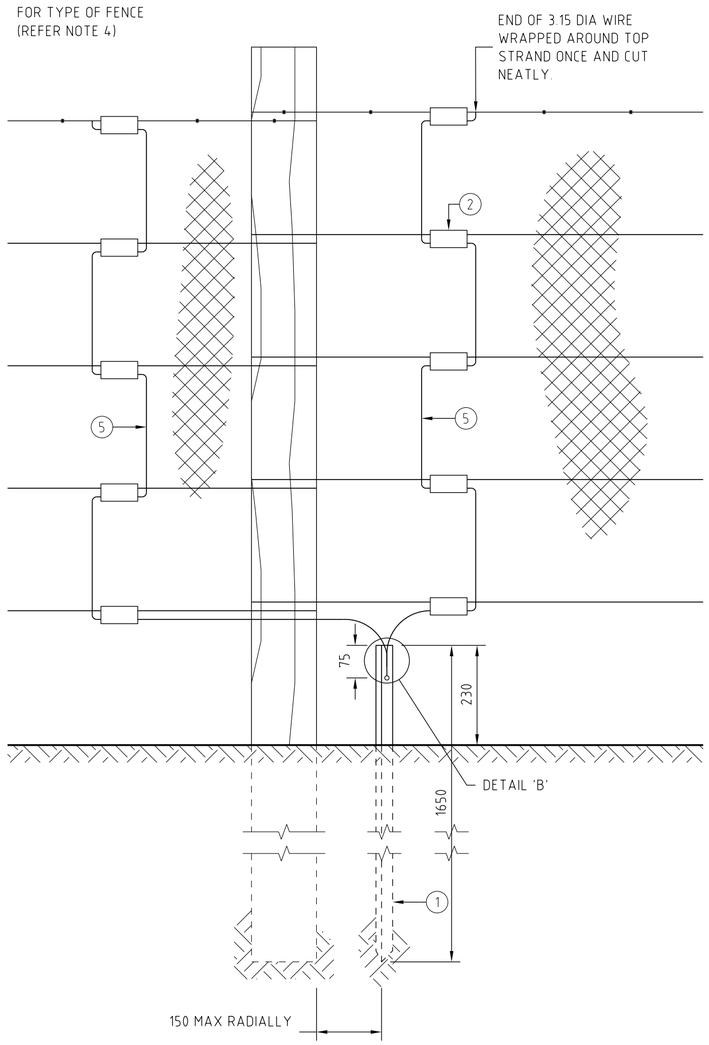
For more information

For further information please contact TransGrid on 1800 222 537.

Appendix A: Earthing of wire fence



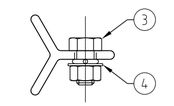
ARRANGEMENT 'A'
(REFER NOTE 3)

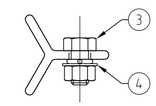


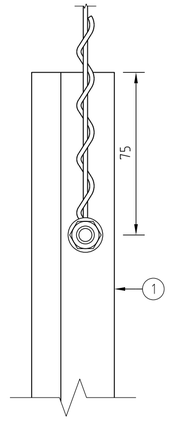
ARRANGEMENT 'B'
(REFER NOTE 3)

NOTES:

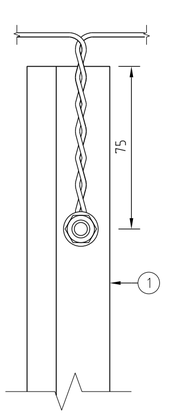
1. THE QUANTITY OF LINE CLAMPS (ITEM 2) IS DEPENDENT UPON THE NUMBER OF STRAIN WIRES ON EXISTING FENCES.
2. WHEN THE EARTH STAKE CANNOT BE DRIVEN TO POSITION AS SHOWN THE FOLLOWING PROCEDURE IS TO BE ADOPTED
   a) WHERE DRIVEN LESS THAN 610 mm:
      CUT OFF AT 230 mm ABOVE GROUND LEVEL AND DRILL TO TAKE CONNECTION BOLT.
   b) WHERE DRIVEN MORE THAN 610 mm:
      TO REMAIN UNCUT AND CONNECTION MADE IN THAT POSITION.
3. i) ARRANGEMENT 'A'
      ARRANGEMENT 'A' TO BE USED WHERE STRAIN WIRE IS CONTINUOUS AND UNBROKEN AT POST.
   ii) ARRANGEMENT 'B'
      ARRANGEMENT 'B' TO BE USED WHERE STRAIN WIRE TERMINATES AT POST AND IS NOT CONTINUOUS.
4. THE NUMBER OF STRAIN WIRES AND USE OF WIRE NETTING IS SHOWN AS ILLUSTRATIVE ONLY AS THE FENCE MAY BE AN OPEN STRAIN WIRE TYPE FENCE OR BE A WIRE NETTING CLAD STRAIN WIRE FENCE.







DETAIL 'A'



DETAIL 'B'

AS REQ'D		RW 85 017	5	———	FENCING WIRE 3.15 mm DIA.	S. GALV.
1	1	WA 65 011	4	———	8 (NOM) FLAT WASHER	S. GALV.
1	1	NA 01 181	3	———	M8 x 25 mm HEX. HD. BOLT & NUT	S. GALV.
AS REQ'D		EF 16 209	2	———	LINE SPLIT BOLT CLAMP.	BRASS
1	1	LM 76 003	1	TL-145554	EARTH STAKE 1650 mm LONG	S. GALV.
A	B	S/L No.	ITEM	DRG No.	DESCRIPTION	MAT'L.
REQUIRED						

UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES.

AMENDMENT TEXT.	TAM	18-07-2016

REDRAW FROM TIFF TO DGN

TransGrid

TL-167142 WIRE FENCE ISOLATION PANEL

REFERENCE DRAWINGS

DRAWN	TAM	
REVIEWED	SBH	21-11-2016
VERIFIED	KTA	21-11-2016
APPROVED	KTA	21-11-2016
APPROVAL STATUS	APPROVED	
SCALE		

TRANSMISSION LINES
DESIGN DATA - EARTHING
EARTHING OF WIRE FENCES

ARRANGEMENT

A2	TL140089	01
	PREFIX NUMBER SHEET	AMDT

INDEX CLASS'N 36-03

400x566

PLOT ISSUE DATE 22/11/2016 8:30:55 AM

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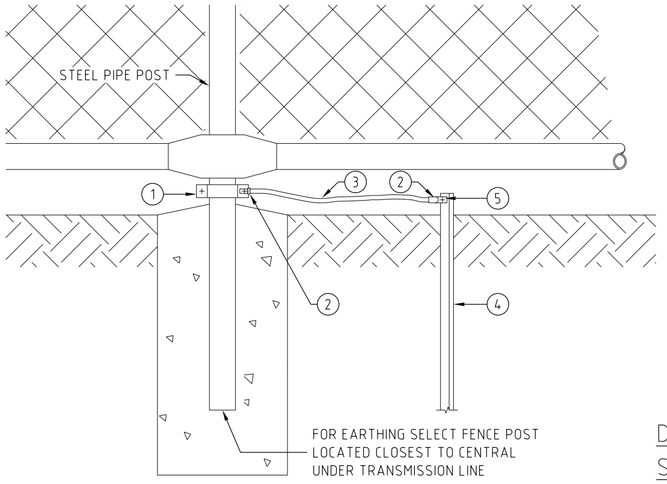
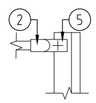
SOURCE DESIGN FILE: \\vsw08323\ics_share$\5710\3650_647\TL-140089_01.DGN

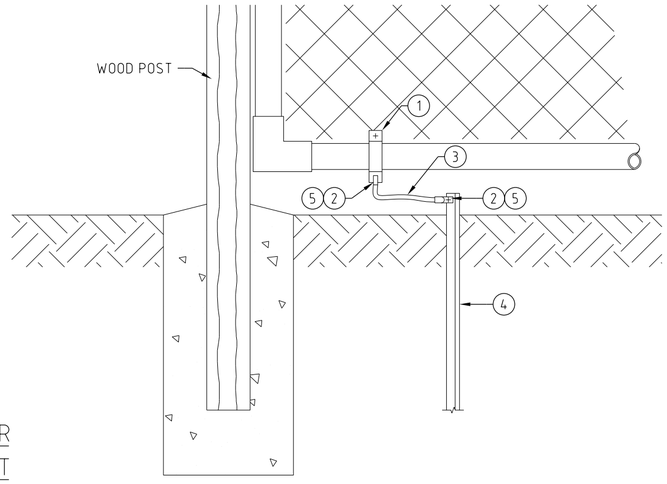
Appendix B: Earthing of steel fences



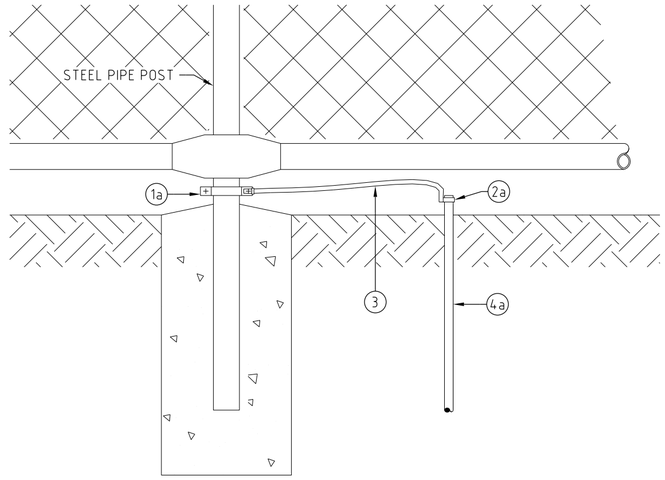
CHAINWIRE FENCE
ARRANGEMENT 1



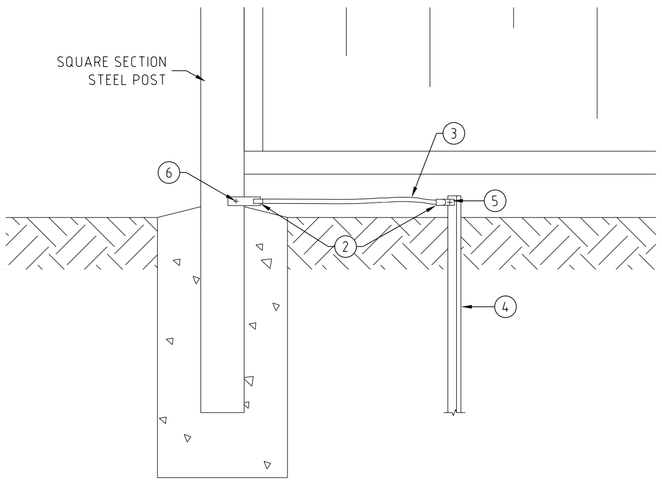
DETAIL FOR
STAR POST
ATTACHMENT



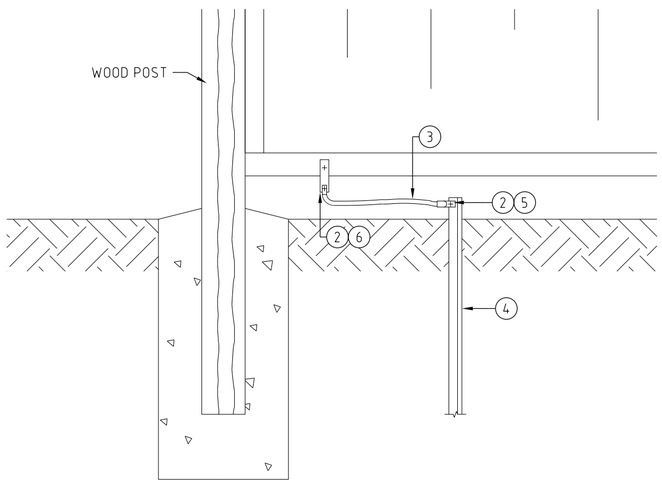
CHAINWIRE FENCE WITH WOOD POST
ARRANGEMENT 1A



DETAIL 1
ALTERNATIVE METHOD OF
EARTHING CONNECTION



COLORBOND FENCE
ARRANGEMENT 2



COLORBOND FENCE WITH WOOD POST
ARRANGEMENT 2A

NOTES:

1. DRIVEN EARTH RODS:
   RODS MUST BE DRIVEN TO A DEPTH OF AT LEAST 1200mm.
   RODS MUST BE LOCATED AT LEAST 300mm CLEAR OF CONCRETE FOOTING FOR FENCE POST.
   ROD MUST BE LOCATED AS CLOSE AS POSSIBLE TO BOTTOM FENCE RAIL.

2. CONNECTIONS TO FENCE & EARTH ROD TO BE PAINTED WITH AN "EXTERIOR GRADE" OF PAINT AFTER MAKING & TIGHTENING OF JOINTS.

3. STAR STAKES MUST BE GALVANIZED & NOT OF THE FULLY PAINTED TYPE.

4. FENCE EARTHING SHALL BE APPLIED TO THE FENCE POST. EARTHING OF THE BOTTOM RAIL (ARRANGEMENT 1A & 2A) SHALL ONLY BE APPLIED WHERE INSTRUCTED BY TRANSGRID.

5. DETAIL 1 SHOWS ALTERNATIVE ARRANGEMENT WHERE AN EARTH ROD IS USED IN PLACE OF A STAR STAKE.

DRG No.	S/L No.	ITEM	DESCRIPTION	MAT'L.
		6	M6/M8 SELF TAPPING SCREW WITH WASHER.	
		5	M8 BOLT AND NUT.	
TL-146911	ST50101	4a	COPPER CLAD EARTH ROD.	
TL-145554	LM76003	4	EARTH STAKE 1650 LONG.	M.S.GAL'V
		3	6mm^2 STRANDED GREEN/YELLOW PVC INSUL.	COPPER
		2a	EARTH ROD CLAMP.	
		2	CRIMP LUG 6mm^2 x 10mm ATTACHMENT HOLE.	E.TIN COPP.
		1a	"MUFFLER" CLAMP.	M.S.GAL'V
TL-140529		1	FENCE EARTHING CLAMP.	M.S.GAL'V

UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES.

AMENDMENT TEXT:	TAM	18-07-2016
REDRAW FROM TIFF IMAGE TO DGN		

TransGrid

TL-829305 STEEL FENCE ISOLATION PANEL

REFERENCE DRAWINGS

DRAWN	TAM	
REVIEWED	SBH	21-11-2016
VERIFIED	KTA	21-11-2016
APPROVED	KTA	21-11-2016

APPROVED
APPROVAL STATUS

SCALE

TRANSMISSION LINES
DESIGN DATA - EARTHING
EARTHING OF STEEL FENCES

ARRANGEMENT

A2	TL192501	01
	PREFIX NUMBER SHEET	AMDT

INDEX CLASS'N 36-03

400x566

PLOT ISSUE DATE 23/11/2016 10:29:15 AM

SOURCE DESIGN FILE: \\vsw08323\ics_share$\5740\3650_645\TL-192501_01.DGN

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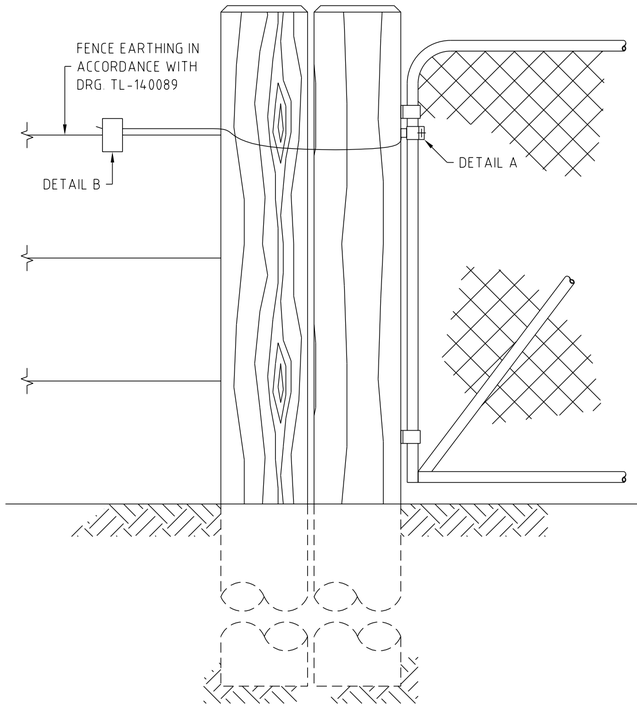
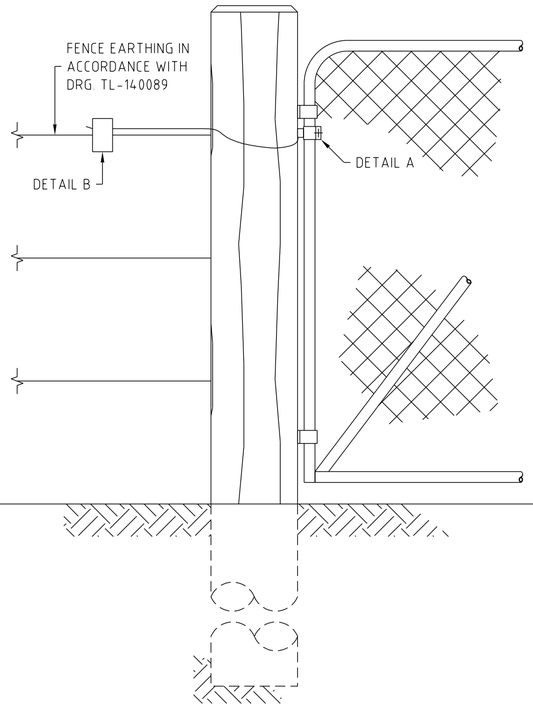
Appendix C: Gate earthing arrangement



'TYPE 1'



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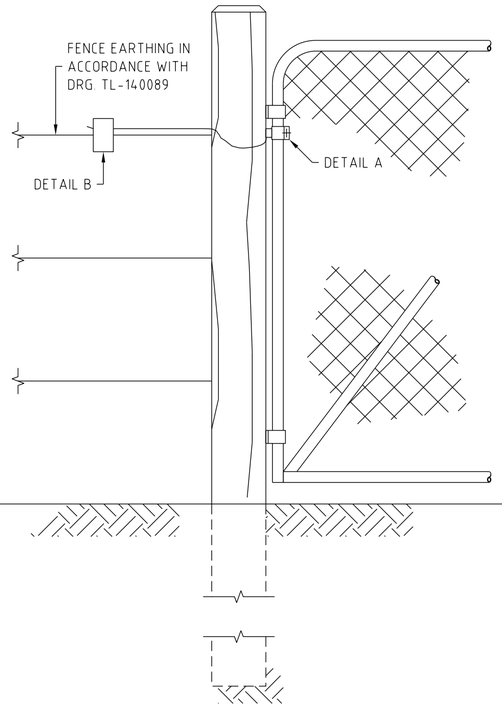

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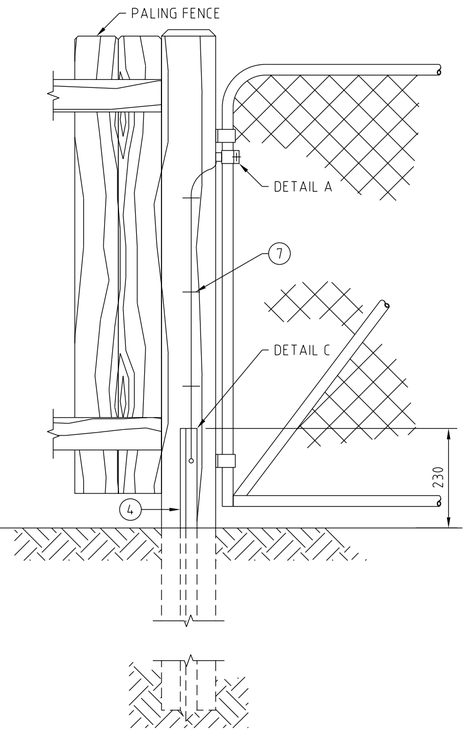
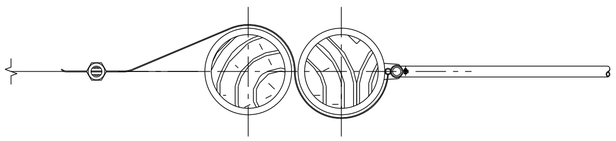
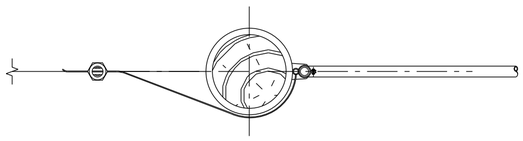
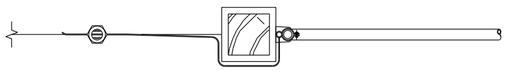


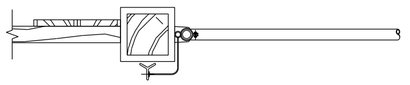
'TYPE 4'

ELEVATION
(TYPES 1 - 4)

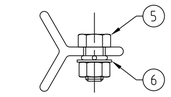


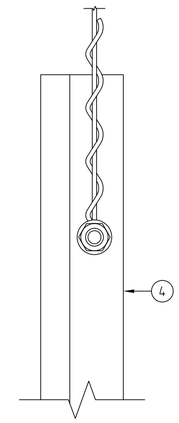






PLAN
(TYPES 1 - 4)

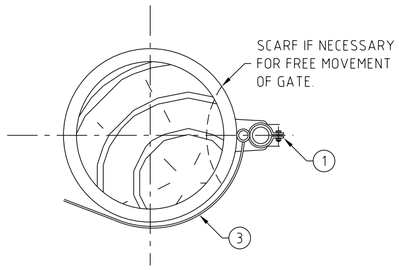




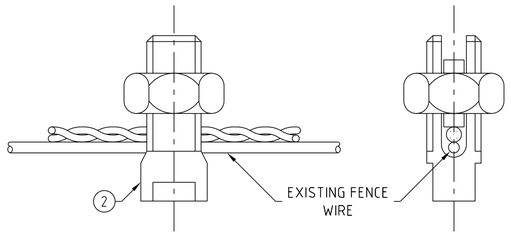
DETAIL 'C'

NOTES:

1. THE GATE EARTHING ASSEMBLY IS TO BE POSITIONED SO THAT MOVEMENT OF THE GATE IS NOT RESTRICTED AND AN EFFECTIVE ELECTRICAL CONNECTION TO THE FENCE EARTHING IS MADE.
2. WHERE EXISTING FENCE EARTHING IS CONSIDERED TO BE INADEQUATE OR ALTERNATIVELY IS NON EXISTENT THEN FENCE EARTHING TO DRG. TL-140089 IS TO BE INSTALLED.
3. IN THE CASE OF A PALING FENCE (TYPE 4). THE GATE IS TO BE EARTHED AS SHOWN. WITH THE EARTH STAKE AS CLOSE TO THE FENCE AS PRACTICABLE.



DETAIL 'A'



DETAIL 'B'

ARRG'T TYPE 4

4	SN 92 289	7	———	STAPLES 4 x 40	S. GALV.
1	WA 65 011	6	———	M8 FLAT WASHER	S. GALV.
1	NA 01 181	5	———	M8 x 25 BOLT & NUT	S. GALV.
1	LM 76 003	4	TL-145554	EARTH STAKE 1650 LONG	S. GALV.
AS REQ'D	RW 68 031	3	———	GATE EARTHING 7/1.25 (6mm^2 MIN)	S. GALV.
1	CD 45 110	1	———	EARTH CLIP	S. GALV.

ARRG'T TYPE 1, 2 & 3

AS REQ'D	RW 68 031	3	———	GATE EARTHING 7/1.25 (6mm^2 MIN)	S. GALV.
1	EF 16 209	2	———	LINE SPLIT BOLT CLAMP	BRASS
1	CD 45 110	1	———	EARTH CLIP	S. GALV.
REQ'D	S/L No.	ITEM	DRG No.	DESCRIPTION	MAT'L.

UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN mm

AMENDMENT TEXT:	TAM	18-07-2016

REDRAW FROM TIFF IMAGE TO DGN

TransGrid

DRAWN	TAM	
REVIEWED	SBH	21-11-2016
VERIFIED	KTA	21-11-2016
APPROVED	KTA	21-11-2016

APPROVED
APPROVAL STATUS

REFERENCE DRAWINGS

SCALE

TRANSMISSION LINES
DESIGN DATA - EARTHING
GATE EARTHING ARRANGEMENT

ARRANGEMENT

A2	TL140098	01
	PREFIX NUMBER SHEET	AMDT

INDEX CLASS'N 36-03

400x566

PLOT ISSUE DATE $$$$$$SYTIME$$$$$$PLOT_TIME$$

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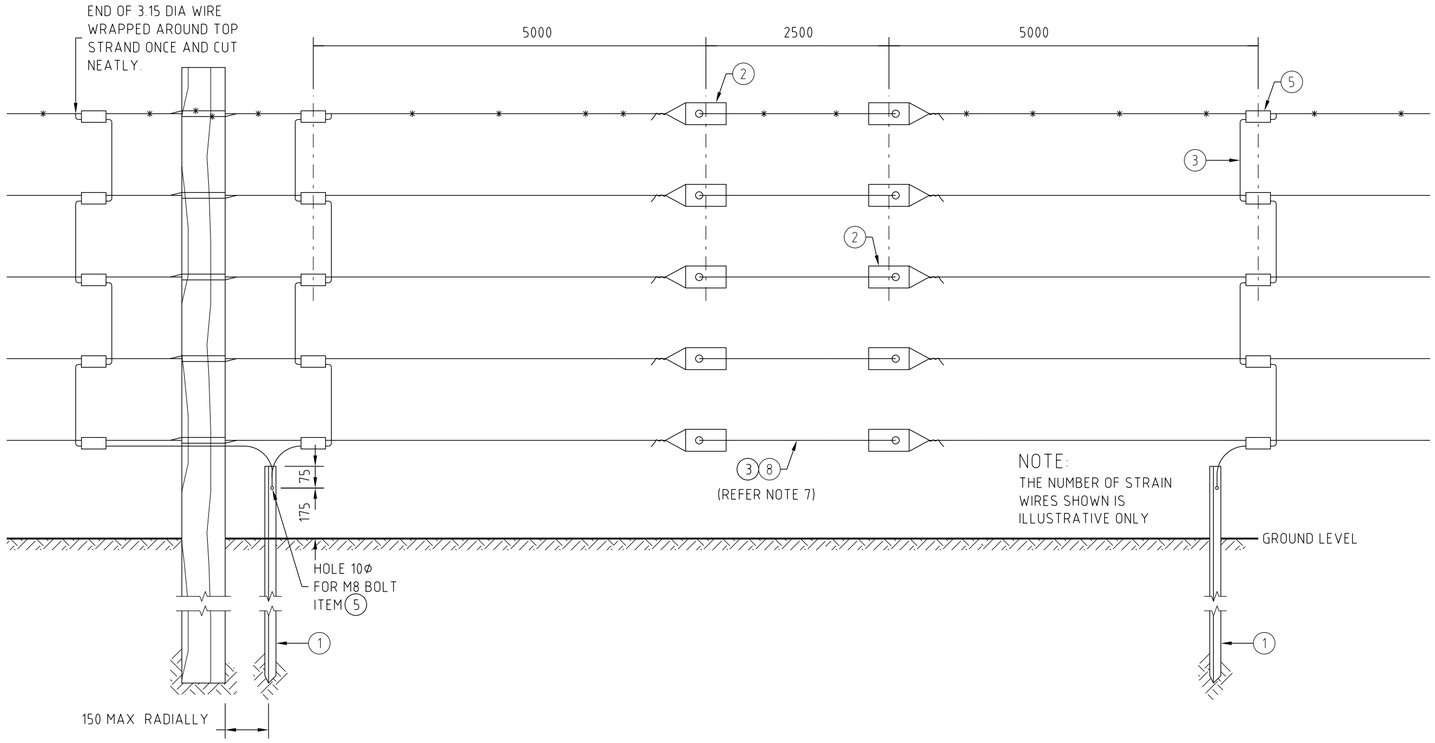
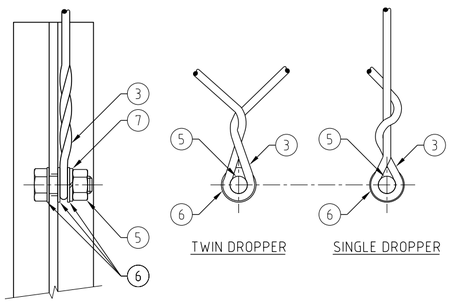
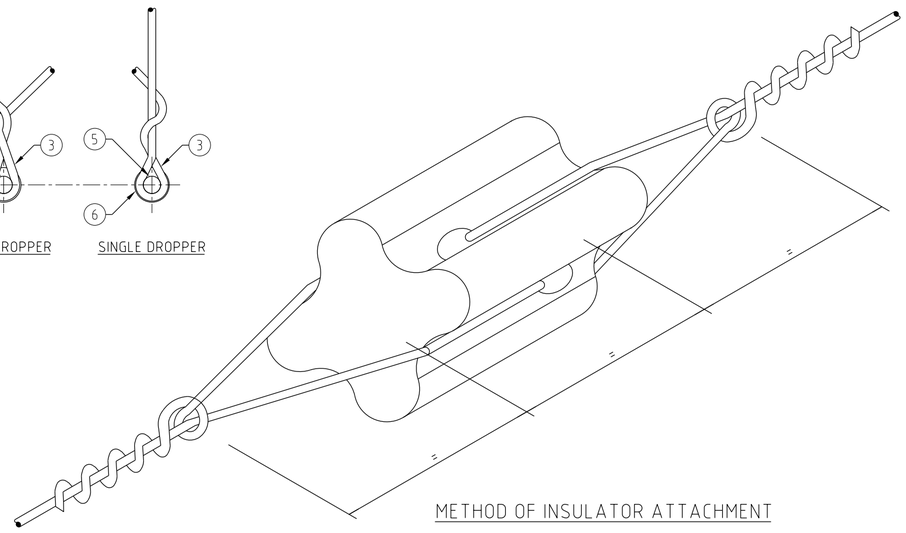
Appendix D: Wire fence isolation panel







METHOD OF INSULATOR ATTACHMENT

NOTES:

1. FENCE NOT TO BE RETENSIONED TO MORE THAN 2kN.
2. THE QUANTITY OF LINE CLAMPS (ITEM 4) & INSULATORS (ITEM 2) IS DEPENDENT UPON THE NUMBER OF STRAIN WIRES ON EXISTING FENCES.
3. WHERE ROCK PREVENTS THE EARTH STAKE FROM BEING DRIVEN INTO POSITION AS SHOWN. THE STAKE MAY BE CUT OFF AT 250mm ABOVE GROUND PROVIDED A MINIMUM DEPTH OF 600mm IS ACHIEVED. WHERE THE STAKE IS DRIVEN INTO ROCK. THE HOLE SHALL BE BACK FILLED AND TAMPED WITH CLAY, SOFT SOIL OR ELSE A SLURRY CONSISTING OF A MIXTURE OF
   - 1 PART BY VOLUME OF CASTING PLASTER
   - 1 PART BY VOLUME OF BENTONITE
   - 4 PARTS BY VOLUME OF WATER
4. EARTH STAKES TO BE CONNECTED TO FENCE SECTION BEFORE FENCE IS CUT FOR INSULATOR INSTALLATION.
5. STAFF INSTALLING FENCE INSULATORS SHALL WEAR APPROVED INSULATING FOOTWEAR, OR STAND ON AN INSULATING RUBBER MAT ABLE TO WITHSTAND AN APPLIED VOLTAGE OF 15kV FOR ONE MINUTE.
6. THE METHOD OF ATTACHMENT SHOWN IN THE INSULATOR ATTACHMENT DETAIL IS APPLICABLE TO ALL PATTERNS OF INSULATORS HELD UNDER S/L LM 50 001.
7. WHERE FENCE INSULATORS ARE TO BE INSTALLED IN BARBED WIRE SECTIONS, BARBED WIRE IS TO BE USED IN PLACE OF 3.15mm FENCING WIRE. BARBS MAY HAVE TO BE SUITABLY TRIMMED TO ALLOW THE WIRE TO PASS THROUGH HOLES IN INSULATOR.

AS REQ'D	RW 78 119	8	———	BARBED WIRE 2.5 mm / STRAND	S. GALV.
2	WA 80 011	7	———	M8 SPRING WASHER	SP. S. GALV.
6	WA 65 011	6	———	M8 WASHER	S. GALV.
2	NA 01 181	5	———	M8 x 25 BOLT & NUT	S. GALV.
AS REQ'D	EF 16 209	4	———	LINE SPLIT BOLT CLAMP	BRASS
AS REQ'D	RW 85 017	3	———	FENCING WIRE 3.15 DIA	S. GALV.
AS REQ'D	LM 50 001	2	———	INSULATORS	PORCELAIN
2	LM 76 003	1	TL-145554	EARTH STAKE 1650 mm LONG	S. GALV.
REQ'D	S/L No.	ITEM	DRG No.	DESCRIPTION	MAT'L

UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES.

AMENDMENT TEXT:	TAM	18-07-2016

REDRAW FROM TIFF IMAGE TO DGN

TransGrid

TL-829305 STEEL FENCE ISOLATION PANEL
TL-205446 RINGLOCK FENCE ISOLATION PANEL
TL-173774 WIRE MESH FENCE ISOLATION PANEL
TL-140089 EARTHING OF WIRE FENCES

REFERENCE DRAWINGS

DRAWN	TAM	
REVIEWED	SBH	21-11-2016
VERIFIED	KTA	21-11-2016
APPROVED	KTA	21-11-2016

APPROVED
APPROVAL STATUS
SCALE

TRANSMISSION LINES
DESIGN DATA - EARTHING
WIRE FENCE ISOLATION PANEL

ARRANGEMENT

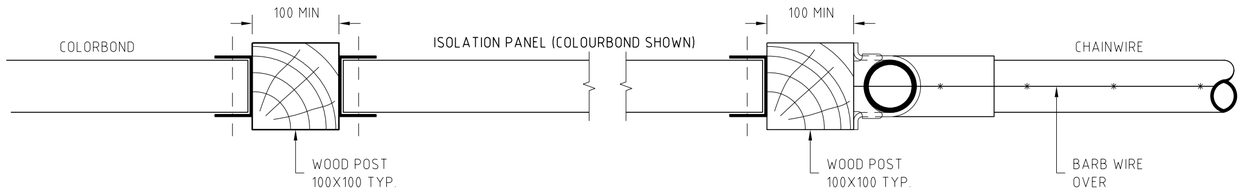
A2 | TL167142 | 01
PREFIX NUMBER SHEET | AMDT

400x566

PLOT ISSUE DATE 21/11/2016 10:00:26 AM | COPIED FROM | SUPERSEDES | SUPERSEDED BY | INDEX CLASS'N 36-03

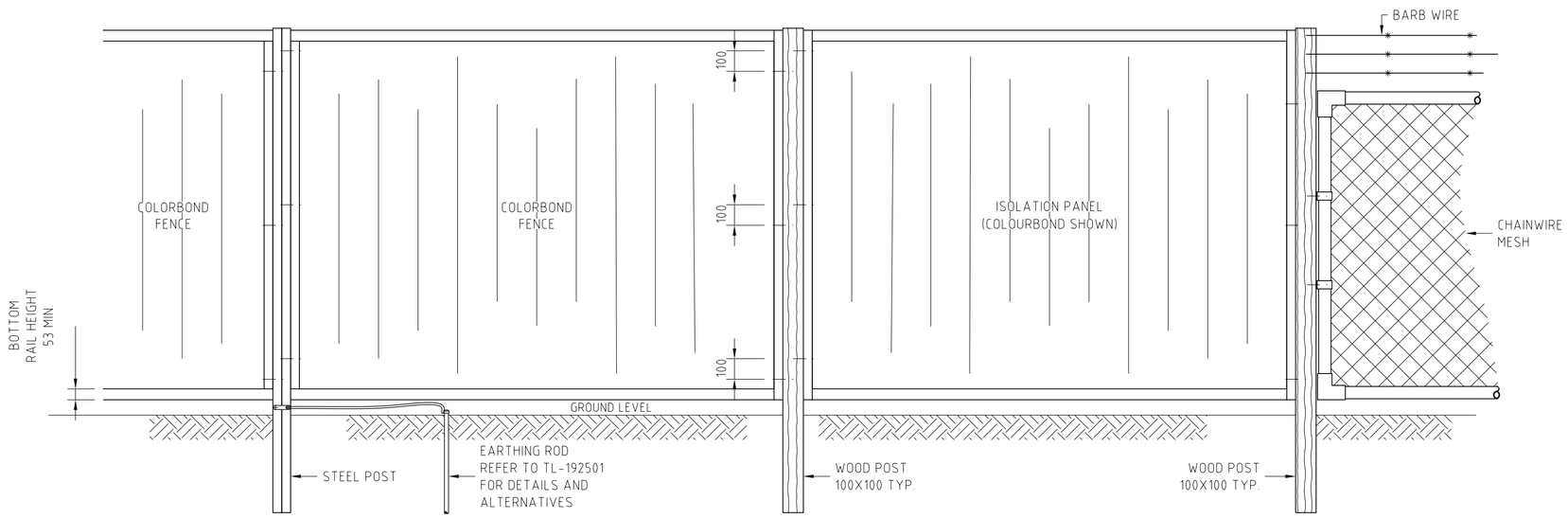
SOURCE DESIGN FILE: \\vsw08323\ics_share$\6\5468_13\TL-167142_01.DGN

Appendix E: Steel fence isolation panel



PLAN

SCALE 1:5



FRONT ELEVATION

SCALE 1:20

NOTES:

1. THE ISOLATION PANEL SHALL NOT BE EARTHED UNLESS SPECIFICALLY DIRECTED BY TRANSGRID.
2. THE FENCE ON EITHER SIDE OF THE ISOLATION PANEL SHALL BE EARTHED IN ACCORDANCE WITH TL-192501.
3. THE SCREWS USED TO FIX THE FENCE PANELS TO THE WOOD POST SHALL NOT PENETRATE MORE THAN 50mm INTO THE POST AND SHALL BE OFFSET AT LEAST 100mm FROM ANY SCREWS USED TO FIX THE PANEL ON THE OPPOSITE SIDE OF THE POST.
4. BOLTS SHALL NOT BE USED TO FIX THE FENCE PANELS TO THE WOOD POSTS.
5. IF WOOD POST ARE TO BE PAINTED THE PAINT SHALL BE NON-CONDUCTIVE.
6. THERE MUST BE NO METALLIC CONNECTIONS (INCLUDING BARBED SECURITY WIRE) WHICH CONNECT TO THE FENCE PANELS ON OTHER SIDE OF THE WOOD POST.
7. COLORBOND AND CHAINWIRE ARE SHOWN ON THIS DRAWING AS TYPICAL EXAMPLES.
   THIS DESIGN CAN BE APPLIED TO OTHER TYPES OF METAL FENCING PROVIDED THE GENERAL ARRANGEMENT CAN BE MAINTAINED.

UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES.

AMENDMENT TEXT:		

TransGrid

TL-192501	EARTHING OF STEEL FENCES
TL-829305	STEEL FENCE ISOLATION PANEL
TL-173774	WIRE MESH FENCE ISOLATION PANEL
TL-167142	WIRE FENCE ISOLATION PANEL

REFERENCE DRAWINGS

DRAWN	TAM	
REVIEWED	SBH	21-11-2016
VERIFIED	KTA	21-11-2016
APPROVED	KTA	23-11-2016

APPROVED
APPROVAL STATUS

SCALE

TRANSMISSION LINES
DESIGN DATA - EARTHING
STEEL FENCE ISOLATION PANEL

ARRANGEMENT

A2	TL829305	00
	PREFIX NUMBER SHEET	AMDT

INDEX CLASS'N 36-03

400x566

PLOT ISSUE DATE 23/11/2016 8:30:20 AM

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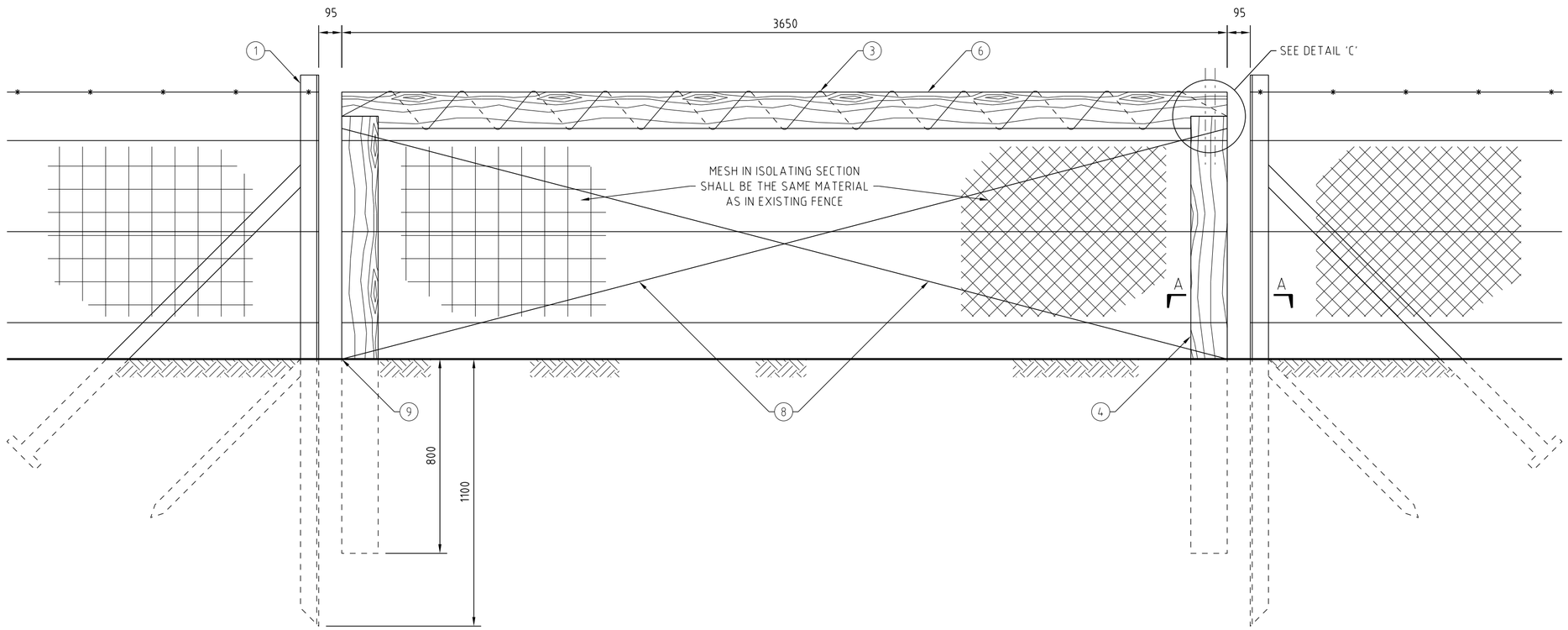
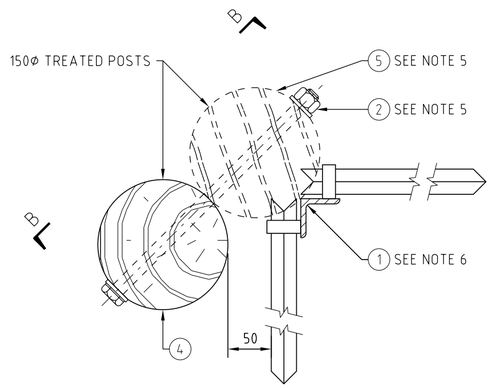
SOURCE DESIGN FILE: \\vsw08323\ics_share$\6\10519_2\TL-829305_00.DGN

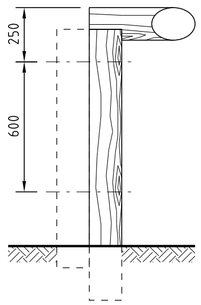
Appendix F: Wire mesh fence isolation panel



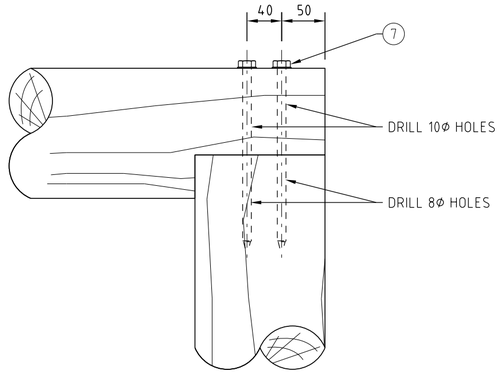
ELEVATION
SCALE: N.T.S.



SECTION A-A
SCALE: 1:5



VIEW 'B-B'
SCALE: 1:20



DETAIL 'C'
SCALE: 1:5

NOTES:
1. THE CENTRAL ISOLATING FENCE SECTION SHALL BE INSTALLED PRIOR TO THE INSTALLATION OF THE STEEL POST ASSEMBLY.
2. TREATED POSTS (ITEM 4) SHALL BE INSTALLED IN BORED HOLES 300Ø & 800 DEEP. BACKFILL SHALL BE BROKEN UP & TAMPED IN LAYERS NOT EXCEEDING 150.
3. STEEL POSTS & ANCHORS SHALL BE DRIVEN INTO THE GROUND IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
4. THE TWO SIDE FENCE SECTIONS SHALL BE TERMINATED ON THE STEEL POST ASSEMBLIES. NO METALLIC CONNECTION SHALL BE MADE BETWEEN THESE FENCE SECTIONS & THE CENTRAL ISOLATING SECTION.
5. IN THE CASE OF RABBIT PROOF FENCING, WHERE REQUIRED BY THE PROPERTY OWNER, THE GAP AT EACH END OF THE CENTRAL ISOLATING FENCE SECTION SHALL BE CLOSED BY THE INCLUSION OF A SECOND POST (ITEM 5) AS DETAILED IN SECTION A-A.
6. THE CLEARANCE BETWEEN METAL PARTS OF THE CENTRAL ISOLATING FENCE SECTION & METAL PARTS OF THE FENCE SECTIONS ON EITHER SIDE SHALL BE A MINIMUM OF 50mm.
7. PINE POST & RAIL SHALL BE PRESSURE IMPREGNATED WITH COPPER CHROME ARSENATE SALTS.

REQ'D	S/L No.	ITEM	DRG No.	DESCRIPTION	MAT'L.
4	———	9	———	5 x 50 CLOUT HEAD NAIL	S. GALV.
AS REQ'D	———	8	———	3.15 FENCING WIRE	S. GALV.
4	———	7	———	M10 BOLT x 200 LONG	S. GALV.
1	———	6	———	TREATED RAIL 150Ø x 3650 LONG	PINE
* 2	———	5	———	TREATED POST 150Ø x 1100 LONG	PINE
2	———	4	———	TREATED POST 150Ø x 1800 LONG	PINE
10m	———	3	———	BARBED WIRE	S. GALV.
* 4	———	2	———	M16 BOLT & NUT	S. GALV.
1	HG 69 009	1	TL-806057 A2	STEEL POST ASSEMBLY	S. GALV.

*SEE NOTE 5

UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES

AMENDMENT TEXT:	TAM	18-07-2016

REDRAW FROM TIFF IMAGE TO DGN

TransGrid

TL-167142 WIRE FENCE ISOLATION PANEL
TL-205446 RINGLOCK FENCE ISOLATION PANEL
TL-829305 STEEL FENCE ISOLATION PANEL

REFERENCE DRAWINGS

DRAWN	TAM	
REVIEWED	SBH	21-11-2016
VERIFIED	KTA	21-11-2016
APPROVED	KTA	21-11-2016

APPROVED
APPROVAL STATUS

SCALE

TRANSMISSION LINES
DESIGN DATA - EARTHING
WIRE MESH FENCE ISOLATION PANEL

ARRANGEMENT

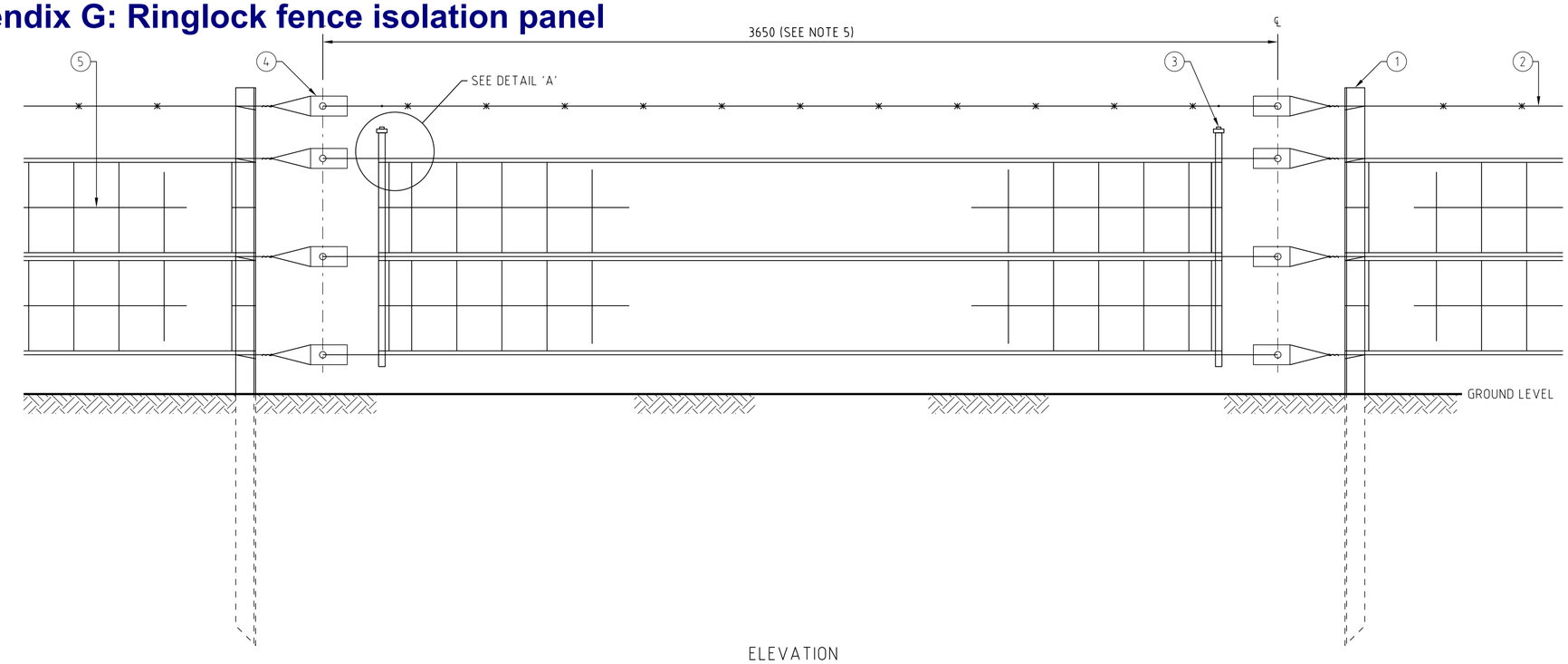
A2 | TL173774 | 01
PREFIX NUMBER SHEET | AMDT

400x566

PLOT ISSUE DATE 22/11/2016 12:07:51 PM | COPIED FROM | SUPERSEDES | SUPERSEDED BY | INDEX CLASS'N 36-03

SOURCE DESIGN FILE: \\vsw08323\ics_share$\5716\3582_926\TL-173774_01.DGN

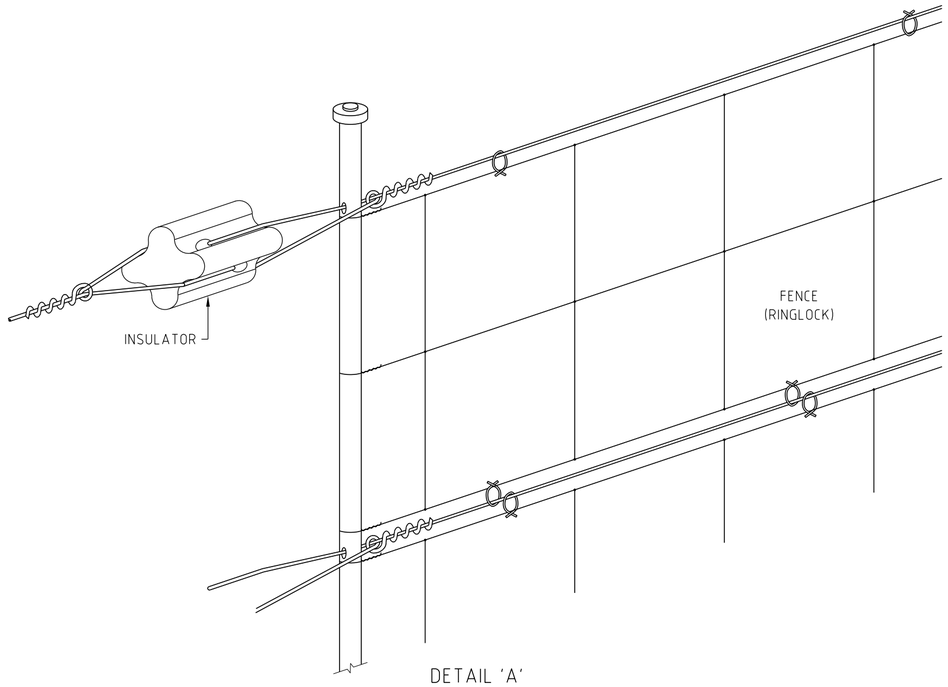
Appendix G: Ringlock fence isolation panel



ELEVATION
SCALE: N.T.S.

NOTES:

1. STEEL POSTS (ITEM 1) ARE TO BE DRIVEN INTO THE GROUND IN ACCORDANCE WITH MANUFACTURE'S INSTRUCTIONS.
2. THE NUMBER OF PLAIN & BARBED WIRE STRANDS IN THE ISOLATING SECTION TO BE AS IN THE ORIGINAL FENCE. FENCE TENSION TO BE MAINTAINED THROUGH ISOLATING SECTION.
3. WIRE & RINGLOCK OF ORIGINAL FENCE IS TO BE TIED TO THE STEEL POSTS ON EITHER SIDE OF THE ISOLATING SECTION (TO EARTH FENCE).
   RINGLOCK OF ISOLATING SECTION PANEL IS TO BE TENSIONED & TIED TO PIPES (ITEM 3) AT EACH END & TIED TO PLAIN STRANDS WITH STAPLES IN ACCORDANCE WITH MANUFACTURE'S INSTRUCTIONS.
4. NO METALLIC CONNECTION IS TO BE MADE BETWEEN THE MAIN FENCE SECTION & THE CENTRAL ISOLATING SECTIONS.
5. DISTANCE BETWEEN INSULATORS TO BE 3650mm MINIMUM. WHERE AN ISOLATING SECTION IS SPECIFIED TO BE INSTALLED IN A FENCE THAT IS LESS THAN 2600mm FROM A CONCRETE POLE OR STEEL TOWER THE LENGTH OF THE ISOLATING SECTION IS TO BE INCREASED TO PROVIDE A MINIMUM CLEARANCE OF 2600mm BETWEEN THE NEAREST POINT OF THE CONCRETE POLE / STEEL TOWER & THE EARTHED SECTION OF THE FENCE.
6. STAFF INSTALLING FENCE INSULATORS SHALL WEAR APPROVED INSULATING FOOTWEAR, OR STAND ON AN INSULATING RUBBER MAT ABLE TO WITHSTAND AN APPLIED VOLTAGE OF 15kV FOR ONE MINUTE.



DETAIL 'A'

AS REQ'D		5		RINGLOCK	S. GALV.
8	LM 50 001	4		INSULATOR	PORCELAIN
2		3		WATER PIPE (25mm N.B.)	S. GALV.
AS REQ'D		2		BARBED WIRE	S. GALV.
2	HG 69 009	1	TL-806057	STEEL POST L 90x6	S. GALV.
REQ'D	S/L No.	ITEM	DRG No.	DESCRIPTION	MAT'L.

UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES

AMENDMENT TEXT		
REDRAW FROM TIFF IMAGE TO DGN	TAM	18-07-2016

TransGrid

TL-167142	WIRE FENCE ISOLATION PANEL
TL-173774	WIRE MESH FENCE ISOLATION PANEL
TL-829305	STEEL FENCE ISOLATION PANEL
TL-205446	RINGLOCK FENCE ISOLATION PANEL

REFERENCE DRAWINGS

DRAWN	TAM	
REVIEWED	SBH	21-11-2016
VERIFIED	KTA	21-11-2016
APPROVED	KTA	21-11-2016

APPROVED
APPROVAL STATUS
SCALE

TRANSMISSION LINES
DESIGN DATA - EARTHING
RINGLOCK FENCE ISOLATION PANEL

ARRANGEMENT

A2 | TL205446 | 01
PREFIX NUMBER SHEET | AMDT

INDEX CLASS'N 36-03

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PLOT ISSUE DATE 22/11/2016 12:07:51 PM

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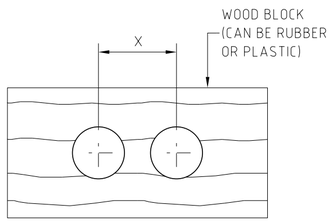
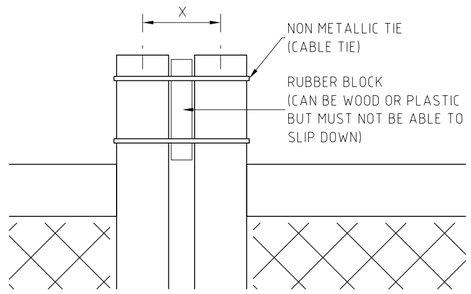
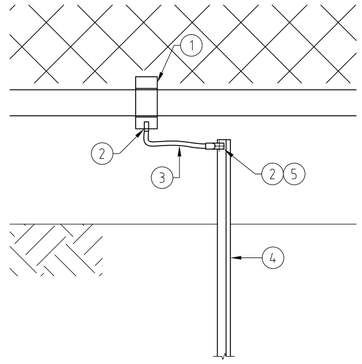
Appendix H: Earthing and isolation of temporary fencing



DETAIL 1
SCALE 1:5



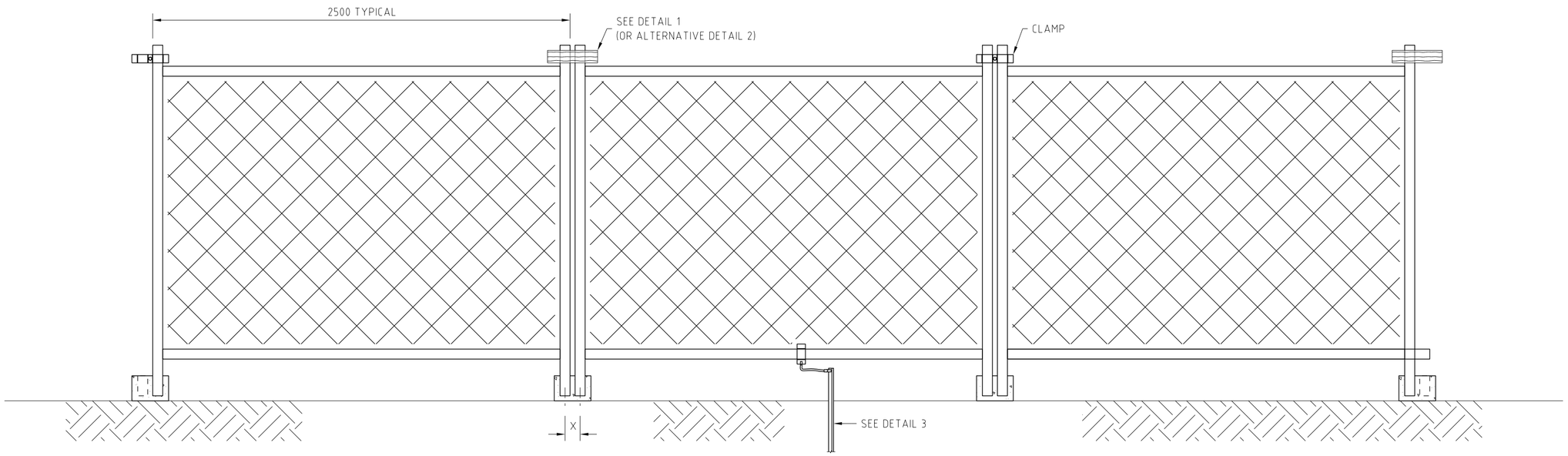
DETAIL 2
SCALE 1:5



DETAIL 3
SCALE 1:10

NOTES:

1. EARTH STAKES:
   MUST BE DRIVEN TO A DEPTH OF AT LEAST 1200mm.
   AND MUST BE LOCATED AS CLOSE AS POSSIBLE TO BOTTOM FENCE RAIL.
2. CONNECTIONS TO FENCE & EARTH STAKE TO BE PAINTED WITH AN "EXTERIOR GRADE" OF PAINT AFTER MAKING & TIGHTENING OF JOINTS.
3. STAR STAKES MUST BE GALVANIZED & NOT OF THE FULLY PAINTED TYPE.
4. REFER TO DRAWING TL-192501 FOR ALTERNATIVE EARTH STAKE/ROD CONNECTIONS.
5. ISOLATION AT EVERY SECOND PANEL CAN BE MADE AS PER DETAIL 1 OR DETAIL 2.
6. POST SEPARATION AT THE MOUNTING BLOCK (DIMENSION 'X') SHOULD BE MAINTAINED AS A MINIMUM AT THE TOP OF THE POST. POST SEPARATION SHOULD NOT BE LESS THAN 50mm IN ANY CASE.
7. FOR FENCES WHERE PANELS ARE SIGNIFICANTLY LONGER OR SHORTER THAN 2500mm THE DISTANCE BETWEEN ISOLATIONS SHOULD BE MAINTAINED AT THE PANEL INTERVAL CLOSEST TO 5000mm.



ELEVATION
SCALE 1:20

		5	M8 BOLT AND NUT.	
TL-145554	LM76003	4	EARTH STAKE 1650 LONG (STAR STAKE).	M.S.GAL'V
		3	6mm^2 STRANDED GREEN/YELLOW P.V.C INSUL.	COPPER
		2	CRIMP LUG 6mm^2 x 10mm ATTACHMENT HOLE.	E.TIN COPP.
TL-140529		1	FENCE EARTHING CLAMP.	M.S.GAL'V
DRG No.	S/L No.	ITEM	DESCRIPTION	MAT'L.

UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES.

AMENDMENT TEXT:		

TransGrid

TL-192501 EARTHING OF STEEL FENCES.

REFERENCE DRAWINGS

DRAWN	TAM	
REVIEWED	SBH	21-11-2016
VERIFIED	KTA	21-11-2016
APPROVED	KTA	21-11-2016

APPROVED
APPROVAL STATUS
SCALE

TRANSMISSION LINES
DESIGN DATA - EARTHING
EARTHING AND ISOLATION OF TEMPORARY FENCING
ARRANGEMENT

A2 | TL899207 (PREFIX NUMBER SHEET) | 00 (AMDT)

INDEX CLASS'N 36-03

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